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EXPERIMENTS ON ALASTRIM.

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On account of some uncertainty as to the nature of an eruptive disease in the West Indies, inoculations have been performed at the Hygienic Laboratory of the United States Public Health Service in an attempt to determine its immunological relationship. The disease has been called *alastrim*, *varioid-varicella*, and *smallpox*. Those who have not called the disease *smallpox* have been led to a different diagnosis primarily by its low death rate and the mildness or absence of the fever during the eruptive stage.

Accounts of the disease (1) (2) (3) (4) (5)¹ differ among themselves as much as any of them differ from what has been observed of the *smallpox* prevalent in the United States for the past 25 years. In general it is stated that the disease has been most prevalent among negroes and has tended to involve the more superficial layers of the skin in the vesicular stage, with relatively little primary umbilication, streptococcal infection, severe pustulation, or permanent scarring. Comparisons of its clinical immunology with that of accepted *smallpox* have been obscured by the nonrecognition of three facts: the acceleration of the reaction to inoculation of vaccine virus in immune individuals (6),² the frequent absence of complete immunity to vaccine virus after an attack of *smallpox* (7) (8) (9),³ and the occasional absence of immunity to *smallpox* after successful vaccination or after an attack of *smallpox* itself (10) (11).⁴

¹ (1) Dickson and Laselle. *Varioid-varicella in Trinidad*: Jour. Trop. Med., 1903, 6, 318.

(2) Clarke. Discussion of paper by Dickson and Laselle: Jour. Trop. Med., 1903, 6, 320.

(3) Aragao. A propisto do *alastrim*: Brazil Medico, 1911, 9, 941.

(4) Rudolph. Weisse Pocken: Münch. med. Wchnschr., 1911, 58, 205.

(5) Melhorn. *Smallpox in Haiti*: U. S. Navy Med. Bull., 1921, 15, 492.

² (6) Force. The Control of *Smallpox*: Modern Medicine, 1921, 3, 177.

³ (7) Bowen. Results of Revaccination in the British Army: Transactions Epidem. Soc. London, 1867, 2, 230. (31.9 to 45.1 per cent of perfect pustules from vaccination of soldiers and recruits showing marks of previous *smallpox*.)

(8) Sinigar. Results of the Vaccination of 1,000 Adults: Lancet, 1902, 1, 951. (89 per cent of pustules from vaccination of adults who gave evidence of previous *smallpox*.)

(9) Force and Stevens. Responsibility of the Vaccinator in Overcoming the Rational Objections to *Smallpox* Vaccination: Journal Lab. and Clin. Med., 1918, 3, 220. (62 per cent *vaccinias* or *vaccinoids* produced on vaccinating young adults who gave a history of previous *smallpox*.)

⁴ (10) Schön. Die Blättern in Afrika und die Schutzpockenimpfung daselbst: Centralbl. f. Bakt., 1896, 20, 641. (Repeated attacks of *smallpox* in negroes are not exceptional, and individuals who have had *smallpox* may be vaccinated later with success.)

(11) Seaton. Handbook of Vaccination, London, 1868, p. 185. (One per cent of the admissions to the *smallpox* hospital in London were second attacks. Some vaccinated persons may contract *smallpox* within a few weeks or months after vaccination.)

Our material was derived from two sources, through the courtesy of Prof. W. G. MacCallum, of Johns Hopkins University, and Lieut. Commander G. F. Clark of the Medical Corps of the United States Navy. In September, 1920, Prof. MacCallum visited Jamaica and investigated a number of cases of alastrim. In the course of his investigation he secured pustule contents from several of the patients. Portions of the material from these patients were mixed with 0.5 per cent phenol in saline solution and sealed in small test tubes. These tubes were brought to Baltimore and placed in cold storage. On March 21, 1921, two of these tubes were secured from Prof. MacCallum, brought to the Hygienic Laboratory in an iced container, and placed in storage at 5° C. On March 4, 1921, Lieut. Commander Clark, who was stationed in Haiti, mailed to the Hygienic Laboratory a sealed tube containing crusts from a patient having alastrim, together with some glass slides on which pustule contents had been dried. This material reached the laboratory on March 21, and was placed in storage at 5° C. With the material from these two sources the following experiments were performed.

Experiment I.

March 26, 1921: Two crusts from the Haitian patient were ground in a mortar with 12 drops of saline. A piece of sterile glass tubing, having an inside diameter of about 3 mm., was encircled by a file scratch and broken squarely off. Approximately 0.5 c. c. of the suspension of crusts was drawn up into the tube and transferred to the left side of the freshly shaved backs of two *Macacus rhesus* monkeys, the tube being held perpendicularly to the tightly drawn skin and rubbed vigorously to and fro while the suspension was released a drop or so at a time. The friction was continued until a distinct reddening of the skin was observed.

The two tubes containing pustule contents from two Jamaican patients (G and H) were centrifuged, opened, and the phenolized saline pipetted off. Enough fresh sterile saline was then added to each tube to give approximately a 1 in 10 suspension of pustule contents. The right side of the back of each monkey was similarly inoculated with these suspensions; the anterior portion with suspension G and the posterior portion with suspension H.

When observed one day after inoculation, the inoculated areas were covered with serum scabs resembling a thin layer of beeswax. Accompanying the scabs were a number of reddish scratches which healed rapidly. With the exception of a slight shrinking, no change occurred in the beeswaxlike scabs until nine days after inoculation, when the following conditions were observed:

Monkey 1.—Right side, anterior, inoculated with Jamaican suspension G: The scab had been picked off, revealing 13 lesions, 12

grouped and one at about 3 mm. distance. The lesion consisted of a reddish elevated base surmounted by a white circular summit having a depressed brownish center. The individual lesion measured 3 mm. in diameter. Right side, posterior, inoculated with Jamaican suspension H: The waxy scab was still adherent. Left side, inoculated with Haitian suspension: The waxy scab was off, revealing 5 scattered lesions similar to those of area "G."

Monkey 2.—Right side, anterior (Jamaican G): There was a group of seven lesions, one decidedly reddened from scratching. The scab was still adherent to area "H." The inoculation of the left side with Haitian alastrim scabs had been made by means of long irregular scratches which healed promptly. The site showed a chain of eight lesions rather more elevated than above described, but with white summits and depressed brown centers.

Eleven days after inoculation:

Monkey 1.—The lesions of the Jamaican G area were much increased in elevation and redness. The monkey had scratched off the whitish tops (vesicles) exposing crater-like depressions. Yellowish crusts were forming. The waxy scab was removed from the Jamaican H area showing perfectly smooth skin beneath. Evidently there had been no itching, which accounts for the persistence of the scab. The Haitian area was similar in appearance to Jamaican G, but the lesions were separate.

Monkey 2.—The lesions on all sites resembled lesions on the corresponding sites on Monkey 1.

The lesions on Monkey 1 were scraped and the scrapings ground with saline. The day following the curetting, reddish scabs formed, which dropped off on the 16th day, leaving crater-like pits. Circular brownish crusts formed on each lesion of Monkey 2, which were removed on the 13th day, exposing crater-like depressions containing a small amount of pus.

Results.—A vesico-papular eruption was produced by the inoculation of two monkeys with crusts from Haitian alastrim and pustule contents from Jamaican alastrim. This eruption was similar to that produced in three monkeys some months previously, inoculated by one of the authors (J. P. L.) with pustule contents from a case of smallpox occurring in the District of Columbia.

Experiment II.

Thirteen days after inoculation with alastrim material, the two monkeys and a normal control were inoculated as follows:

Monkey 1.—Inoculated with a highly potent vaccine virus in four needle scratches each about 3 cm. in length.

Monkey 2.—Reinoculated with the alastrim material (Jamaican G) which had produced an eruption on both monkeys. The material was rubbed in with glass tubes as described in the first experiment.

Monkey 4.—A normal animal was inoculated in seven needle scratches with the potent vaccine virus used on Monkey 1.

One day after inoculation:

Monkey 1.—The vaccination scratches were slightly elevated, but there was no redness.

Monkey 2.—A waxy scab had formed at the inoculation site.

Monkey 4.—The vaccination scratches had almost healed, there being no elevation or redness.

Three days after inoculation:

Monkey 1.—The scratches had healed, there being no elevation or redness.

Monkey 2.—No change.

Monkey 4.—No change.

Four days after inoculation:

Monkey 1.—Slight papule at end of one scratch.

Monkey 2.—No change.

Monkey 4.—The vaccination scratches showed distinct papules measuring 4 mm. across the line of scratch, with areolæ of 5 mm.

Five days after inoculation:

Monkey 1.—The scratches were no longer palpable.

Monkey 2.—Part of the waxy scab was removed, exposing a skin area slightly roughened, but with no signs of inflammation.

Monkey 4.—Vesicles were beginning to form on the summits of the papules.

Six days after inoculation:

Monkey 1.—No change.

Monkey 2.—All the waxy scab had come off, exposing two red spots 2 mm. in diameter, the rest of the area being smooth.

Monkey 4.—All seven scratches showed papules composed of overlapping circles with vesicles beginning at the summits.

Eight days after inoculation:

Monkey 1.—No change.

Monkey 2.—Small red spots fading.

Monkey 4.—There was definite vesicle formation over the entire papular area.

Ten days after inoculation:

Monkey 1.—No change.

Monkey 2.—There was a slight roughness of the skin as if papules had formed and disappeared.

Monkey 4.—Brownish scabs were beginning to form in the center of the vesicles.

Results.—A monkey successfully inoculated with Haitian and Jamaican alastrim was refractory to a strain of vaccine virus which gave a typical vaccinia in a normal monkey. A monkey successfully inoculated with Haitian and Jamaican alastrim was refractory to the same Jamaican alastrim.

Experiment III.

March 28, 1921: Rabbit A was shaved and inoculated with alastrim material (Jamaican G), 1 in 10 suspension on the right side, 1 in 50 on the left side. The technique was like that described for the inoculation of the monkeys with alastrim. Rabbit B was similarly inoculated with Jamaican H.

April 6, 1921: During the nine days following inoculation no eruption had appeared at any of the inoculated sites. Rabbit A was re-inoculated with scrapings from the eruption produced by the Haitian crusts on Monkey 1. Rabbit B was re-inoculated with scrapings from the eruption produced by Jamaican G pustule contents on Monkey 1. Three days after re-inoculation a slight patchy erythema appeared on Rabbit A, which disappeared the next day. There was no change in the inoculated area on the other rabbit. The abrasions produced by the inoculation healed quickly.

April 15, 1921: Rabbit A was vaccinated with dilutions of a potent vaccine virus, a normal rabbit being used as a control. The area vaccinated with each dilution measured 2.5 by 5 cm. At the end of seven days a few accelerated lesions had developed and dried to tiny brown crusts. The control rabbit had typical seventh-day full vaccinia vesicles.

Rabbit A and control.

Dilution of vaccine virus.	Eruption on Rabbit A.	Eruption on normal rabbit.
1:1,000.....	21 discrete lesions.....	Confluent, covering 100 per cent of the inoculated area.
1:3,000.....	19 discrete lesions.....	95 per cent confluent.
1:10,000.....	5 discrete lesions.....	Do.
1:30,000.....	1 lesion.....	50 per cent confluent.

April 16, 1921: Rabbit B was vaccinated, using the same technique, virus, and dilutions as Rabbit A. A control was also vaccinated. The results seven days later were as follows:

Rabbit B and control.

Dilution of vaccine virus.	Eruption on Rabbit B.	Eruption on normal rabbit.
1:1,000.....	6 discrete lesions.....	Confluent, covering 75 per cent of the inoculated area.
1:3,000.....	3 discrete lesions.....	50 per cent confluent.
1:10,000.....	No lesions.....	40 per cent confluent.
1:30,000.....	do.....	5 discrete lesions.

Twenty other normal rabbits have been inoculated before and since with dilutions of this vaccine virus, using the same technique, and in none has the eruption been so accelerated or so scanty as that observed on Rabbits A and B.

Results: A rabbit (A) was inoculated cutaneously with alastrim pustule contents (Jamaican G), which had produced eruptions on two monkeys. No eruption was produced on the rabbit. Nine days later the rabbit was reinoculated cutaneously with scrapings from an eruption produced in a monkey by Haitian alastrim. A transient erythema was produced. Nine days after the reinoculation the rabbit was again inoculated cutaneously with dilutions of a potent vaccine virus and showed a few tiny scattered lesions which were definitely accelerated and had become crusted on the seventh day, at which time a confluent eruption on a control rabbit was at its height. The rabbit, was, therefore, almost completely immune to vaccine virus.

Another rabbit (B) was inoculated with alastrim pustule contents (Jamaican H) which produced no results on monkeys. No eruption was produced on this rabbit. Nine days later the rabbit was reinoculated with scrapings from an eruption produced on a monkey by Jamaican G alastrim. No eruption was produced. Ten days after the reinoculation, the rabbit was vaccinated with essentially the same results as in Rabbit A.

Two rabbits were therefore immunized to alastrim to such a degree that, though they showed no eruption, they were later observed to be almost completely immune to vaccine virus, the scanty lesions being in no sense imperfect in development but definitely accelerated, as in vaccinoid.

Experiment IV.

March 29, 1921: Six rabbits which had recovered from vaccinia, together with two normal controls, were inoculated intracutaneously with enough of the following materials to produce a 10 mm. bleb at each inoculation site: Suspensions (1:10) of smallpox crusts, chicken pox crusts, Jamaican G alastrim, Jamaican H alastrim, and vaccine virus, and enough Haitian alastrim vesicle contents (which had been received dry on slides) to make a suspension, when mixed with saline, comparable in turbidity with the other suspensions.

A positive immune reaction was taken to be indicated by the appearance of a reddened areola with a papule of at least 5 mm., which reached its height on the second or third day following inoculation. Both controls and one of the vaccinated rabbits were negative at all inoculation sites. The remaining rabbits were all negative to chicken pox and all positive to smallpox and vaccine virus. All gave very doubtful reactions to the Jamaican H strain of alastrim, the strain which had failed to produce eruptions on monkeys. Of four sites inoculated with Haitian alastrim, three showed positive reactions, and of three inoculated with Jamaican G alastrim, two were positive.

Two weeks later a second series of inoculations was performed, using three rabbits of the first series, three normal controls, and two other previously vaccinated rabbits. The material was the same as before except that suspensions of crusts from lesions produced on a monkey by Haitian and Jamaican G alastrim were substituted for the original (human) Haitian and Jamaican H materials. Fresh vaccine virus was also used. Possibly on account of the age of the material, negative or doubtful reactions were observed, except with the fresh vaccine virus. The chicken pox was, however, consistently negative.

Results: Smallpox crusts, vaccine virus, and alastrim material produced positive intracutaneous reactions in animals previously immunized to vaccine virus. Chicken pox did not produce such reactions.

Summary of Results.

A vesico-papular eruption was produced in monkeys by inoculation both with crusts and with vesicle contents from alastrim patients. The animals were protected against reinoculation with alastrim and vaccine virus. Rabbits inoculated with alastrim showed no eruption, but were almost completely immune to vaccine virus. Rabbits previously inoculated with vaccine virus gave positive intracutaneous reactions to smallpox crusts, alastrim material, and vaccine virus, but remained negative to chicken pox crusts.

The fact that definite immunity to vaccinia is produced by previous inoculation with alastrim is additional evidence of the essential identity of alastrim with smallpox.

INHALATION EXPERIMENTS ON INFLUENZA AND PNEUMONIA, AND ON THE IMPORTANCE OF SPRAY-BORNE BACTERIA IN RESPIRATORY INFECTIONS.¹

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During the epidemic of influenza occurring in the winter season of 1919-20, the junior author was assigned by the Public Health Service to cooperate with the senior author in a study of this disease. The work was done in the Pathologic Institute of the University of Cincinnati. The institute is in direct connection with the Cincinnati General Hospital. This close association of the institute with the hospital presented a favorable opportunity for securing fresh

¹ From the Laboratory of Bacteriology and Hygiene, University of Cincinnati, and the United States Public Health Service.

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The experiments were made possible by the Christian R. Holmes fund for research.

² Detailed to the work by the United States Public Health Service.

specimens early in the course of the disease, for studying the individual cases, and for securing post-mortem material when such material was available.

At the beginning, three lines of study were adopted: (1) A routine bacteriological examination of throat swabs, sputum, and blood from typical influenza and influenza-pneumonia patients; (2) attempts to transmit influenza to animals by spray-borne material and by other methods of exposure; and (3) a study on the importance of spray-borne bacteria in relation to pneumonic infections in general. As the results obtained suggested, from time to time, under divisions (2) and (3), various factors which might prevent infection in the animal or which might predispose the animal for infection were tried out.

ROUTINE BACTERIOLOGICAL EXAMINATIONS.

In the routine bacteriological examination of throat swabs, sputum, and blood specimens attention was given only to cases which appeared typical. Thirty-eight such cases were examined. The medium used for isolation was agar, reaction +0.5 to phenolphthalein and containing 5 per cent of fresh defibrinated rabbit's blood. All cultures were made in triplicate and were incubated at 37° C., under aerobic, partial tension oxygen, and anaerobic conditions. *B. influenzae*-like organisms were isolated from 12 of the 38 cases. Six of the 12 (Table I, strains 1 to 6) were from one family, S., all of whom became ill at about the same time. From the father of this family we failed to isolate *B. influenzae*, and he was ill for months with streptococcus empyema. In 4 of the cases from this family, *B. influenzae* was present in the sputum in pure culture. Most of the other organisms isolated belonged to the pneumococcus, hemolytic streptococcus, and staphylococcus groups. Of the 38 cases, 31 harbored hemolytic streptococci, and in 17, the pneumococcus was the predominant species present. No colonies were encountered which showed any resemblance to those of the colon-typhoid-enteritidis groups.

No trouble was experienced in isolating *B. influenzae* on our medium. When grown under partial tension oxygen conditions, it retained its minute bipolar form and showed less tendency to produce involution forms than when grown under aerobic conditions. None of our strains of *B. influenzae* would grow unless hemoglobin in some form was present in the medium. The *B. influenzae* colonies were small in size and dewdrop-like in appearance, unless they were growing in close proximity to colonies of staphylococci, when they grew much larger and tended to coalesce. The Koch-Weeks strains isolated by us have grown out on plain ascites agar containing no hemoglobin.

PREPARATION OF ANTIGENS AND SERA FOR AGGLUTINATION WORK.

Antigens were prepared for the agglutination work as follows: The medium used was meat infusion 2 per cent agar, adjusted to a reaction +0.5 to phenolphthalein. (For the influenza strains, 5 per cent of defibrinated rabbit's blood was added while the medium was at a temperature of about 90° C.) The medium was used as slants in half-pint Blake bottles. Twenty-four-hour slants of the organism from which antigen was to be made were washed off in 5 c. c. of broth. This amount of emulsion was used to seed the surfaces of two Blake bottle slants. The bottles were then placed in the incubator, and after allowing the broth emulsion to stand on the medium for about 2 hours, the bottles were inverted and incubated for 48 hours. They were then removed, and the remaining broth, together with any condensation water, was pipetted off and thrown away. Five c. c. of saline were then added to each bottle, and the growth was washed off. This emulsion was placed in a sterile test tube and killed immediately by heating at 65° C. for 30 minutes. During this time, smears of the emulsion were made and examined for purity. If not pure, they were discarded. The tubes were then centrifuged at high speed, the supernatant fluid was poured off, and fresh saline which contained 0.5 per cent of phenol was added. The emulsion was then diluted until it had a turbidity of 1,000 p. p. m. by the Fuller method of measuring turbidity. This procedure gave uniformly a good antigen.

Antisera for the agglutination work were prepared for the influenza and Koch-Weeks bacillus by inoculating rabbits with live cultures. In the case of the enteritidis-like organism, designated M-5, described later, killed cultures had to be used because of the high virulence of that organism for laboratory animals. Fairly low-titer sera, 1/800, were used in these tests.

Table I contains the serological reactions of the influenza strains with the "Mother" and Koch-Weeks antisera. The first 6 strains were isolated from the different members of a family (S.) of 10, all of whom had influenza and had become ill at approximately the same time. The seventh culture, listed C, was isolated from the sputum of a normal individual who did not have and had not had influenza in any form. The eighth strain, A, was isolated from a post-mortem lung, and was the only organism that we were able to cultivate from the specimen. The last culture, listed "Koch-Weeks," was isolated from a typical case of "pink-eye" and was added to the stock to obtain the serological comparison. The remaining strains listed were obtained from the sputa of isolated cases.

One observes from Table I that 4 of the strains from the family S. group, "Mother," B, S, and M, and the normal strain, "C," are

probably identical with each other. One other of the family strains, H, is somewhat related to this group, but is about as closely related to the Koch-Weeks strain. The other strains tested are serologically (agglutinin and agglutinin absorption test) entirely different from the "Mother" and the Koch-Weeks strains. This agrees with the work of others, Krumwiede et al., 1919 (Jour. Med. Res. 39, p. 449), who have established the facts that there is a relationship between the influenza strains and the Koch-Weeks bacilli, and that there are distinct subdivisions among the so-called *B. influenzae* strains.

Where possible, specimens of blood for serological use were obtained from patients from whom cultures of *B. influenzae* had been isolated. In no instance were we able to demonstrate agglutinins for the bacteria isolated from these cases.

TABLE I.—*B. influenzae*—Agglutination and absorption of agglutinin reactions.

Strain.	Mother antiserum.		Koch-Weeks antiserum.	
	Simple agglutination.	Homologous agglutinins absorbed.	Simple agglutination.	Homologous agglutinins absorbed.
(1) Mother	+	+	—	—
(2) B	+	+	—	—
(3) H	+	P	+	P
(4) St	+	+	—	—
(5) M	+	+	—	—
(6) S	—	—	—	—
(7) C	+	P	—	—
(8) A	—	—	—	—
(9) Sum	—	—	—	—
(10) K	—	—	—	—
(11) Leo	—	—	—	—
(12) Koch-Weeks	—	—	+	+

NOTE.— + means positive agglutination; — means no agglutination; P means homologous agglutinins (those for antigen with which antiserum was made) are only partially absorbed. When simple agglutination tests were negative, absorption tests were not done.

ATTEMPTS TO TRANSMIT INFLUENZA TO WHITE MICE, RATS, GUINEA PIGS, AND RABBITS, BY MEANS OF SPRAYED SPUTUM.

While it is realized that the influenza virus appeared to be of reduced virulence during the outbreak of the spring of 1920, the occasional occurrence of a family outbreak, or of rapid death due to pulmonary edema, seemed to indicate that it was identical with the virus present in the outbreak of 1919. We feel particularly sure that we were dealing with true cases of influenza in the family S., where the mother, father, and 8 children all came into the hospital at once. Most of these 10 cases had broncho-pneumonia and one had purulent pleuritis. Cases R and S, B and B, and T were of a milder type, although B and T had secondary broncho-pneumonia. These cases had been ill for only a day or two at the time the experimental material was collected.

While the examinations into the bacteriology of the cases were being carried out, attempts were made to transfer the infection directly to animals. It was thought that greater success might be achieved in reproducing the disease in animals if they were exposed to the infectious material in the form of a fine spray in the air which they were breathing. By this method the virus would come in contact not only with the nose, eyes, mouth cavity, and trachea of the animal, but it would also be carried down into the finest air passages of the lungs, as is shown in later experiments.

To do this, a "spray chamber" was devised, with a door which could be sealed after the animals had been placed inside. In addition, the box was arranged with two openings, one through which the spray was introduced by forcing it in with an atomizer, and the other an air vent (fitted with a cotton filter) to allow the escape of the excess air pressure created by the introduction of the spray. The animals exposed were placed in this chamber, and the contained air was kept saturated with the spray for from 30 minutes to an hour. A glass window was provided for the cage so that one might observe the saturation of the atmosphere and the condition of the animals. Each series of animals was kept in a separate cage. The cages were scalded with hot water before they were used for any given series. The sawdust bedding was not sterilized. Precautions were taken to sterilize the drinking pans in the case of all mouse experiments. The animals were fed on cracked maize and vegetable waste from the hospital kitchen.³

In doing the following experiments, sputum, or, when this could not be obtained, material swabbed from the tonsillar area, but generally both, were thoroughly shaken with 0.9 per cent salt solution and sprayed into the "spray chamber" by means of a De Vilbiss atomizer, within half an hour after the collection of the specimen.

The data of the sputum-spray experiments and experiments resulting from the death of sputum-spray animals, is compiled chronologically in Table II.

³ It might be noted here that one of us, in Cincinnati, inoculated sterile milk with influenza sputum (1919) incubated it at 37°, 24°, and 15° for from 1 to 14 days, and fed it to white rats and white mice. Out of about 40 animals so fed, only 2 mice died—one with pneumococcus septicemia, and 1 with pneumonia and serous pleuritis, which was due to 4 different bacteria. None of these bacteria, singly or combined, produced infection when fed to other mice in milk or broth cultures.

TABLE II.—*Influenza—Sputum-spray experiments.*

Date.	Source of material used to infect.	Method of exposure.	Number and species of animals exposed.	Number of animals fatally infected.	Number infected animals with pneumonia.	Minimum and maximum duration of illness (days).	Percentage of fatalities.	Remarks.
1920.								
Feb. 3.	Sputum S.	Spray.	5 mice.	1	2	19-73	80	All like M-5.
Do.	do.	do.	4 w. rats.	2	2	13	50	Sterile.
Do.	do.	do.	2 G. P.	2	4	8-80	100	Like M-5.
Feb. 22.	Lung emulsion M-1.	Intraperitoneal.	2 mice.	2	0	6-8	100	General infection like M-5.
Feb. 23.	Mixed culture M-1 plate.	Spray.	2 mice.	2	2	8-12	100	M-6 like M-5.
Mar. 2.	Lung emulsion M-1.	do.	2 mice.	1	2	12	50	Like M-5.
Feb. 25.	Lung emulsion M-2.	do.	2 mice.	0	0	.....	0	.....
Feb. 26.	Organ emulsion W-1, W-2.	Intraperitoneal.	2 w. rats.	0	0	.....	0	.....
Feb. 16.	Organ emulsion G. P. 3.	Spray.	2 mice.	1	0	.....	50	General infection like M-5.
Do.	do.	do.	2 G. P.	1	0	.....	50	Negative obtained from any tissue.
Do.	Sputum cultures case S.	do.	6 mice.	2	2	31-45	33	Killed and found normal May 2, 1920.
Do.	do.	do.	2 G. P.	0	0	.....	0	.....
Do.	do.	do.	2 w. rats.	0	0	.....	0	.....
Do.	do.	do.	1 rabbit.	1	1	.....	100	Gram positive coccus present in lung in large numbers.
Feb. 16.	Culture R-1.	Intravenously, intraperitoneal.	2 rabbits.	2	2	34-40	100	Infecting agent not R-1.
Mar. 2.	Sputum R and S.	Spray.	2 mice.	2	1	33-45	100	Like M-5.
Do.	do.	do.	1 G. P.	1	1	35-36	100	Do.
Mar. 3.	Sputum B and B.	do.	2 mice.	4	1	30-33	50	Like M-5. One sterile.
Apr. 4.	Lung emulsion B and B, 30-day mouse.	Intraperitoneal.	2 mice.	1	1	.....	50	Like M-5.
Apr. 7.	Lung emulsion B and B, 38-day mouse.	do.	1 mouse.	1	1	.....	100	Do.
Mar. 5.	Sputum B and B.	Spray.	6 mice.	1	0	.....	100	Like M-5, from lung.
Do.	Sputum T.	do.	6 mice.	2	0	72-84	33	Like M-5.

† R 1.

‡ M 5, M 6.

§ G. P. 3.

¶ W 1, W 2.

‡ M 1, M 2.

§ killed.

RESULTS OF SPUTUM SPRAY EXPERIMENTS.

(a) *Family S., sputum spray.*—Four of the 5 mice exposed to the sputum spray of family S. died infected with a strain of *B. enteritidis* designated in this article as M-5. Two of these 4 mice died of a primary pneumonia which was due to M-5. By the term primary pneumonia we mean a pneumonia without a marked involvement of the liver and spleen, which invariably occurs in a general infection, e. g., after feeding.

Of 2 guinea pigs exposed to the sputum spray, one died with primary pneumonia caused by M-5. A normal saline extract was made of the spleen, liver, and lungs of this animal, and 2 mice and 2 guinea pigs were exposed to its spray. One of these mice and one guinea pig died of a general infection produced by M-5.

Four white rats were also exposed to the family S. sputum spray. Two of these rats died of a primary pneumonia. Lung cultures made from these animals yielded no growth. Organ extracts from these 2 rats were made and injected subcutaneously and intraperitoneally into other rats with negative results. Unfortunately a spray exposure was not done with the material from the rats.

As a control on (a), mixed cultures of the sputum used for spraying from family S. were made on rabbit's blood agar plates, incubating them for 24 hours at 37° C. under partial tension oxygen conditions. Six mice, 2 guinea pigs and 1 rabbit were exposed to a heavy spray of an emulsion made from this culture. Of these, 2 mice and 1 rabbit died of a primary pneumonia. Exhaustive cultural methods were used on these animals, but no bacteria like M-5 could be isolated. All cultures from the mice were sterile, and a gram positive coccus was the only organism isolated from the rabbit. The latter organism failed, however, to reproduce the disease in other rabbits. These animals were taken from the same lot as those used in the S. sputum spray experiments. These results were influential in leading to the conclusion, which is brought out later, that there is some infectious substance in the sputum or throat swabs of early cases of influenza which predisposes to later organized infection.

(b) *R and S sputum spray.*—Of the 2 mice and 1 guinea pig exposed to the spray, one mouse and the guinea pig died of a primary pneumonia produced by M-5. The remaining mouse died of a general infection caused by M-5.

(c) *B and B sputum spray of March 3, 1920.*—Of the 8 mice exposed to this sputum spray, one died of a pneumonia produced by M-5, and 2 died of an M-5 general infection.

(d) *B and B sputum spray of March 5, 1920.*—After the two-day interval, sputum was again collected from cases B and B, and 6 mice were exposed to its spray. Of these, 1 mouse died of a general infection due to M-5, but not until after a period of 2 months. The remaining mice were examined 3 months later and found to be normal.

(e) *Sputum spray, T.*—Six mice were exposed to this spray. Two died after 2 months; one had a general infection with M-5, the other mouse was normal except for congestion of the lungs. No bacteria could be detected. Upon examination after 3 months, the others of this lot were found to be normal and did not harbor M-5.

SUMMARY AND CONCLUSIONS OF SPUTUM SPRAY EXPERIMENTS.

The animals sprayed with influenza sputum comprised 33 white mice, of which 4 died of primary pneumonia and in addition to these 4 mice, there were 9 which died of a general infection with M-5. Out of this same lot of mice, 6 were sprayed with culture material, and of these, 2, which died, were sterile on bacteriological examination, 2 were killed and cultured two months later and found to be uninfected, and 2 were used for another experiment in which they survived for a month.

Of 5 guinea pigs exposed, 2 died of primary pneumonia. The lungs of these animals contained numerous *B. enteritidis*-like organisms which were culturally and serologically identical (agglutination and absorption) with M-5. Of 6 white rats similarly exposed, 2 died of a primary pneumonia due to an unrecognized cause and not transmissible to rats by subcutaneous or intraperitoneal inoculation.

The work of Krumwiede, Valentine, and Kohn (Jour. Med. Research, 1919, 39, p. 449) shows that these laboratory animals may develop spontaneous infection with members of the paratyphoid-enteritidis group. We did not encounter a single death among our unused stock due to such bacteria, nor were we able to isolate such bacteria from the intestinal tract, liver, spleen, or lungs of 6 normal mice. However, the experiments detailed below (Table VII) show that a certain number of mice which are intoxicated by killed cultures of M-5 or by the sterile Berkefeld filtrate of broth cultures develop a secondary infection with M-5. In such endogenous infections following intoxication, pneumonia occurred only twice out of 40 animals treated.

Furthermore, of 29 mice sprayed with a virulent culture of the pneumococcus, only 1 died of infection with M-5, and this mouse had received a previous dose of M-5 toxin.

On the other hand, as is shown later in Table V, mice exposed to spray cultures of M-5 almost invariably died of a primary pneumonia.

In the light of the above data one is tempted to believe that the animals developing infection with M-5 were injured in some way by something in the influenza sputum. Nevertheless the possibility of purely spontaneous infections exists, and the question can be settled only by further work with more adequate controls, i. e., an equal number of animals from each lot used for an experiment should have been kept under identical conditions as controls.

INOCULATION OF OTHER ANIMALS.

From one of the typical cases, R, 20 c. c. of blood was obtained. This was used to inoculate a series of animals not generally used in laboratory experiments, with the hope that a susceptible animal might be encountered. These were an 8-weeks-old pig, weighing about 100 pounds, a ferret, an opossum, a salamander, and a black-headed nun-bird. None showed any abnormal symptoms during 3 months' observation.

THE CULTURAL AND AGGLUTINATIVE RELATIONSHIP OF M-5.

A collection had been made of the *B. enteritidis*-like organisms isolated from animals dying from infection after they had been exposed to the sputum sprays. A preliminary comparative study was made of the members of this collection to see if they were the same organism as the original type isolated, designated M-5. It was found that there was exact correspondence between the organisms isolated, in regard to their agglutination, absorption of agglutinins, and cultural characteristics. The animals from which these strains were isolated came from several different lots; some were bought in the local markets, others were shipped from near-by towns, while about one-half the supply came from the stock of the Hygienic Laboratory, Washington, D. C.

It was thought opportune to make a study of this enteritidislike organism, comparing it in particular with the Danysz virus, the paratyphoids, and *B. enteritidis* itself. Since all the *B. enteritidis*-like organisms isolated from the mice and guinea pigs exposed to sputum sprays corresponded in their agglutination, absorption, and cultural characteristics, we used M-5 alone for the comparative study. Unfortunately only two antisera, M-5, with a titer of 1-800, and paratyphoid B., with a titer of 1-10,000, were available. The results of this test are given in Table III. It will be observed from this table that M-5 is entirely distinct from paratyphoid B., but that it is indistinguishable by this test alone from the Danysz virus and from *B. enteritidis*. However, the cultural results (Table IV) show that Danysz virus agrees with paratyphoid B. in its failure to ferment xylose, whereas M-5 agrees with *B. enteritidis* in the fermentation of this substance. This divergence was brought out by Krumwiede, et al., 1919. We have been helped also in this study by reference to the work of Jordan (Jour. Inf. Dis., 1920, 26, p. 427, and his preceding articles cited here) and that of Winslow, Kligler, and Rothberg (Jour. Bacteriology, 1919, 4, p. 429). The Danysz virus and paratyphoid B. were from the Hygienic Laboratory, and the *B. enteritidis* was of the Gaertner type and came from Prof. E. O. Jordan in 1901.

Five cultures of *B. enteritidis*-like organisms isolated from the stools of influenza patients by Sherwood, Downs, and McNaught (*J. Inf. Dis.*, 1920, 26, p. 16) were kindly sent to us by Dr. Sherwood. None of these strains agglutinated with M-5 antiserum.

TABLE III.—*Simple agglutination of certain strains by B. paratyphoid B. and M-5 antisera, and the absorption of homologous agglutinins from the same.*

Strain.	Para B. antiserum.		M-5 antiserum.	
	Simple agglutination.	Homologous agglutinins absorbed.	Simple agglutination.	Homologous agglutinins absorbed.
M-5.....	—	—	+	—
Para B.....	+	+	+	—
Enteritidis.....	—	—	+	+
Danysz virus.....	—	—	+	+

EXPERIMENTS SHOWING THAT BROTH CULTURES OF M-5 CONTAIN A SOLUBLE TOXIN WITH WHICH AN ANTITOXIN MAY BE PRODUCED.

In working with broth cultures of M-5 it became evident that after the culture had been put through a Berkefeld N the filtrate contained a toxic substance. Plain, maltose, and dextrose beef infusion broths were tried out in an attempt to demonstrate this toxin. It was found that 0.1 per cent dextrose broth (+0.5) yielded the most potent toxin. After incubation at 37° C. for from 4 to 5 days the culture was filtered through a Berkefeld N. This filtrate would kill mice in from 12 to 18 hours when 0.05 to 0.1 c. c. was injected intraperitoneally. Seventy mice were used in establishing the nature and potency of this toxin. Mice dying of intoxication showed marked injection of the subcutis and congestion of the lungs. Often the pulmonary congestion bordered upon consolidation. The lungs often showed numerous capillary hemorrhages. Other organs and tissues appeared normal to the eye.

We found that about 2 c. c. of this toxin was the minimum lethal dose (M. L. D.), on intravenous inoculation, for a rabbit weighing 1,800 gms. By inoculation with sublethal doses and gradually increasing the amount at 2-day intervals, over a period of three weeks, a rabbit could tolerate 5 c. c. of a freshly prepared toxin. Eight days after the last dose of toxin the serum of this rabbit would protect mice when mixed with 2 M. L. D. of the toxin and at once inoculated intraperitoneally.

ANIMALS EXPOSED TO M-5 CULTURE SPRAY DEVELOP PNEUMONIA. SIMILAR RESULTS FOLLOW THE DANYSZ VIRUS SPRAY, WHEREAS NEGATIVE RESULTS ARE OBTAINED FROM A B. INFLUENZÆ SPRAY.

Inasmuch as the organism M-5 had been consistently found in the infected lungs of animals dying after exposure to the sputum sprays, an attempt was made to infect animals in a similar way by exposing them to a spray containing this strain in pure culture. Accordingly, 26 mice were exposed at various times to an M-5 culture spray. In connection with this experiment, 6 mice were exposed to a Danysz virus culture spray and 4 mice to *B. influenzae* culture spray. This influenza culture used was a fresh one, being the first transfer from a culture isolated from a post-mortem lung 48 hours previously.

The results as recorded in Table V show that of 26 animals exposed to M-5 culture spray, 24 died of primary pneumonia in which the cause was the organism M-5. Five of 6 mice exposed to a culture spray of the Danysz virus died of primary pneumonia, whereas there were no fatalities and no illness among the group of mice exposed to a spray of a freshly isolated *B. influenzae*.

TABLE V.—Experiments showing that when animals are exposed to the spray of M-5 cultures, a large percentage develop pneumonia, and that similar results follow the spray of Danysz virus.

Date.	Animals exposed.	Number of deaths.	Percentage dead with primary pneumonia.	Duration of illness in days.	Remarks.
1920					
Mar. 12.....	4 mice.....	4	100	4-20	Sublethal dose M-5 given few hours before spray. One toxin death.
Mar. 17.....	10 mice.....	8	100	4-15	
Mar. 30.....	4 mice.....	4	75	1-10	
Mar. 25.....	5 mice.....	4	100	4-12	Danysz virus spray. <i>B. influenzae</i> .
Apr. 8.....	1 mouse.....	1	0	16	
May 11.....	2 guinea pigs.....	2	100	11-17	
May 5.....	6 mice.....	5	100	12-20	
Mar. 24.....	4 mice.....	0	0	.....

ATTEMPTS TO IMMUNIZE AGAINST M-5 CULTURE SPRAY BY INOCULATION WITH A KILLED CULTURE AND WITH SUBLETHAL DOSES OF M-5 SOLUBLE TOXIN.

As soon as it was known that the exposure of mice to M-5 culture spray produced a fatal primary pneumonia, attempts were made to immunize them against such infection. The data of the attempts to immunize with toxin are contained in Table VI. Four mice, controls, were exposed to the spray without any previous treatment. Of these, one, or 25 per cent, died. It was a typical M-5 pneumonia. The other 3 remained normal. Upon being chloroformed and examined 2 months later, no M-5 bacilli could be detected in their lungs.

TABLE VI.—*Experiments showing failure to immunize against M-5 culture spray by previous inoculations of sublethal doses of M-5 soluble toxin.*

Date.	Number of mice.	Number of deaths.	Percentage dead with primary pneumonia.	Duration of illness, in days.	Remarks.
1920.					
April 6.....	4	3	100	11-18	One dose soluble toxin 6 days before spray.
Do.....	5	4	100	12-44	Four doses soluble toxin at 3-day intervals. Last dose 5 days before exposure to spray.
Do.....	4	1	100	14	Controls without toxin.

Four mice were given 1 sublethal dose of M-5 toxin 6 days before exposure to the spray. Three of the 4 died in from 11 to 18 days with a typical M-5 pneumonia. Five mice were given 4 sublethal doses of M-5 soluble toxin at 3-day intervals, the last dose being given 5 days before the exposure to the culture spray. Four of the 5 mice died with a typical M-5 pneumonia. Apparently the normal fresh mice are not as susceptible to pneumonia following a short exposure to the M-5 culture spray as the mice that have been immunized with the toxin.

The data of the attempts to immunize with M-5 killed culture are included in Table VII. The vaccine was prepared by washing off an M-5 agar slant culture with normal saline and immediately killing by heating to 65° C. for one hour. The vaccine was then diluted to about the density of an ordinary 24-hour typhoid broth culture growth and preserved with 0.5 per cent phenol. Each mouse was given 0.1 c. c. subcutaneously at each dose. Three tests for sterility were made on the vaccine, one before it was used, one during use, and one after the vaccinations had been completed. It was found sterile at all times. There is no apparent difference between the vaccinated and nonvaccinated mice as far as infection with the spray is concerned. It is interesting to note that 2 of the mice in the series became infected (general infection) with M-5 after vaccination but previous to the exposure to the spray.

TABLE VII.—*Experiments showing failure to immunize against M-5 spray by previous subcutaneous inoculation with a killed culture.*

Date.	Number of mice.	Number of deaths.	Percentage dead with primary pneumonia.	Duration of illness in days.	Remarks.
1920.					
May 7.....	4	4	100	12-23	1 dose 10 days before exposure to spray.
Do.....	4	3	133	1-8	2 doses at 4 days' interval. Last dose 10 days before spray.
Do.....	4	3	166	8-14	3 doses at 4 days' interval. Last dose 10 days before spray.
Do.....	5	5	80	6-14	Controls not vaccinated.

¹ Two mice died of general infection with M-5 before the time for exposure to the spray.

ATTEMPTS TO PRODUCE A PRIMARY PNEUMONIA IN MICE BY EXPOSING THEM TO M-5 CULTURE BY OTHER MEANS THAN THE SPRAY.

Having shown that mice are very susceptible to an M-5 primary pneumonia when they are exposed to its culture spray and that they are not protected from this pneumonia by the ordinary means of immunization, it seemed pertinent to determine whether or not this pneumonia could be produced by other means of exposure. The results obtained are shown in Table VIII.

TABLE VIII.—*Experiments showing that primary pneumonia is not produced in mice when inoculated with M-5 by other means than spray.*

Date.	Method of inoculation.	Number of mice.	Number of deaths.	Percentage dead with primary pneumonia.	Duration of illness in days.	Remarks.
1920.						
Mar. 18.....	Fed heavily.....	4	3	0	6-14	General infection.
Apr. 20.....	do.....	2	2	50	8-9	General infection; 1 with secondary pneumonia.
Do.....	do.....	2	2	0	12-17	General infection.
Do.....	Fed 5 drops.....	4	3	0	10-18	Do.
Do.....	Fed 1 drop.....	4	1	0	8	Do.
May 11.....	Subcutaneous.....	3	3	0	2-5	Do.
Mar. 31.....	Intraperitoneal.....	4	4	0	2-4	Do.
May 11.....	Ocular conjunctiva.	3	2	50	9-19	General infection; 1 with secondary pneumonia.

The mice fed M-5 were kept without food and water for from 1 to 2 days. Those fed drops of the culture were watched while they lapped up the drops of a 24-hour culture. Those fed heavily ate bread soaked with the broth culture. The mice injected subcutaneously were given minute portions of a young culture. Those inoculated in the ocular conjunctiva had loopfuls of the culture placed on the conjunctiva and in a similar way culture was placed in the nostrils of those infected by way of the anterior nares.

When the portal of entry was through the conjunctiva, the buccal and gastrointestinal mucosa, the subcutis or peritoneal cavity, general infection followed. In no case was there a primary pneumonia. In 2 cases there was a secondary pneumonia. In such cases the liver and spleen were greatly enlarged and full of whitish necrotic or proliferative areas. These organic lesions are not present in mice dying of inhalation pneumonia.

EXPERIMENTS SHOWING THAT SPRAYED BACTERIA ARE ACTUALLY INHALED INTO THE DEEPEST PARTS OF THE LUNGS.

When it was found that animals exposed to a spray of M-5 culture consistently developed a primary pneumonia, whereas those exposed by other means developed such an infection only very rarely, if at

all, it was considered advisable to attempt to demonstrate the presence of bacteria in the lungs after exposing the animals to such spray. Accordingly, a series of experiments was started. The results of these attempts follow.

(a) Four mice and 1 guinea pig were sprayed with a broth culture of M-5 and chloroformed within 30 minutes from the beginning of the experiment. They were wet with alcohol and immersed in 1:1,000 bichloride of mercury solution for 5 minutes. Then they were dissected, with aseptic precautions, and from each animal 4 to 6 small pieces of the lungs (1 to 3 m.m. in diameter) were snipped off with sterile scissors and planted in broth. In every instance all the pieces yielded growth of M-5 within 24 hours. Many of the pieces of lung represented the extreme distal portions of the anterior and posterior lobes. Five normal mice controls were examined in the same way. All cultures from these remained sterile during 72 hours' observation.

(b) Experiment (a) was duplicated except that a very virulent pneumococcus (Type 1) was used and the tissue was planted in glucose rabbit blood broth. The 4 mice were killed and cultured as in experiment (a), with the exception that they were examined at 2, 4, 8, and 18-hour intervals after the spray. In every instance the cultures showed that pneumococci were present in the deepest parts of the lungs. Cultures from 1 control mouse yielded no growth in the same medium.

ATTEMPTS TO PRODUCE PNEUMONIA IN MICE BY SPRAYING PNEUMOCOCCI.

Having shown that sprayed bacteria reach the deepest alveoli, or capillary bronchi, of the lungs, and that pneumococci planted in this way survive in the lungs of mice for at least 18 hours, the maximum period tested, we made the following experiments with a type 1 pneumococcus. This culture had been kept highly virulent for mice at the Hygienic Laboratory, United States Public Health Service.

(a) Four mice were sprayed with the growth from 4 blood agar slants suspended in broth. They were exposed for 30 minutes. Two died of primary lobar pneumonia in 14 days. No bacteria could be found in the purulent exudate, and all cultures remained sterile. The remaining 2 were killed 6 weeks later. They appeared normal, and cultures from the lungs remained sterile.

(b) Ten mice were kept at 8° C. for 4 hours and then sprayed as under (a). They felt warm on removal from the ice box. Two were killed and cultured shortly after spraying. Pneumococci grew out of all pieces of their lungs including the most distal portions. At the end of 4 weeks the remaining 8 mice were chloroformed and cultured with negative results.

(c) Since M-5 soluble toxin injures the lungs of mice, 6 mice which had survived sublethal doses of this toxin given 10 days before were sprayed as under (a). They were killed 6 weeks later and found to be normal. Nor did they harbor pneumococci.

(d) Four mice were given sublethal doses of M-5 toxin and sprayed with pneumococci at once, as under (a). Six weeks later one of these mice died of pneumonia caused by M-5; no pneumococci could be found. The remaining 3 were killed and cultured 8 weeks later. They were normal and the cultures remained sterile.

(e) Three mice were sprayed, as under (a), with the pneumococcus and then, in an attempt to give them an acidosis, they were kept under ether for one hour. One of these was further chilled in ice water for 10 minutes. They survived and yielded no growths 4 weeks later.

(f) Two mice were sprayed with a broth suspension of bloody sputum from a case of pneumococcus lobar pneumonia. They remained well during 6 weeks' observation.

Since none of the 29 mice became infected after inhaling virulent pneumococci into their lungs, one may conclude that some predisposing factor must precede or accompany such an implantation of bacteria. While we owe the whole idea of droplet infection to Flügge and his pupils and confess that we have relied on the review of their work by Göetschlich (*Handbuch d. path. mikroorg.*, Kolle and Wasserman, 2d. ed. Bd. 2) we are not aware whether these workers demonstrated the fact that bacteria are to be recovered from the deepest portions of the lungs of sprayed animals. Our attention was drawn to this by Rogers (*Amer. Rev. Tuberc.* 1919, 3, p. 238, and *idem*, 1920, 3, p. 750), of Cincinnati, who showed that tubercle bacilli could be recovered from the lungs of guinea pigs immediately after spraying them with tuberculous sputum, and that such protected and sprayed animals develop true primary pulmonary tuberculosis.

We know the work of Dürck (*Deutsch. Arch. f. Klin. Med.* 1897, 58, p. 368) who, by means of intratracheal insufflation, was unable to infect the lungs of rabbits with freshly isolated cultures of pneumococcus, *streptococcus pyogenes*, and *staphylococcus aureus*, unless at the same time, or before or after, injurious dust particles, pumice, or "Thomasphosphatmehl" were also blown into the lungs. According to his work, sterile injurious dust produced pneumonia, whereas sterile street dust did not. He also describes the production of typical pneumonia in rabbits, with secondary invasion of the pneumonic areas by *B. coli*, Sarcinae, or Friedlander's bacillus, by keeping the rabbits at 37° to 41° C. for from 16 to 36 hours and then in ice water for from 2 to 7 minutes.

However, these experiments and those performed by the method of intrabronchial insufflation, which was introduced by Lamar and Meltzer (*J. Exp. Med.*, 1912, Vol. 15) and used by many others in this country, do not appeal to us as representing what must take place under natural conditions. It is difficult to introduce infectious material by this method without so injuring the mucous membranes as to make the inoculation subcutaneous. Bacteria can be inhaled, however, into the deepest parts of the lungs; and if they are capable of multiplying there, they will produce pneumonia, as in the case of M-5. The fact that virulent pneumococci do not multiply when planted in the lungs of mice by air currents is an interesting fact and deserves further investigation.

SUMMARY AND CONCLUSIONS.

1. When white mice, white rats, and guinea pigs were exposed to finely divided influenza sputum sprays, some died of a primary pneumonia, others of a general infection that was due to a strain of *B. enteritidis* (Type M-5). Since the work of other investigators has shown that these animals may die of spontaneous infection with members of the paratyphoid-enteritidis group, we can not say that these infections were necessarily the sequel to the spray. However, as primary pneumonia could not be produced in mice when M-5 was inoculated through the buccal or gastrointestinal mucosa, the conjunctiva, subcutis, or peritoneal cavity, but only when sprayed, it seems to us likely that something in the sputum sprays produced a change in the pulmonary tissues favoring such secondary localization.

2. Broth cultures of M-5 contain a soluble toxin which produces marked congestion of the subcutaneous and pulmonary tissues of white mice. This toxin gives rise to an antitoxin when injected into rabbits. Previous inoculation with the toxin did not produce immunity to the development of primary pneumonia by sprayed cultures.

3. We were unable to immunize against the spray of M-5 cultures by previous subcutaneous inoculations with a dead culture.

4. The intoxication of mice with the soluble toxin or with killed cultures of M-5 apparently led to infection with M-5 in a small percentage of the used mice. We were not able to find this bacterium in normal mice, nor did spraying mice with virulent pneumococci make it show itself as a secondary invader.

5. Experiments show that M-5 and virulent pneumococci are inhaled by mice into the deepest alveoli or capillary bronchi of the lungs, and that primary pneumonia follows in the case of M-5 which is capable of growing and producing its toxin there, whereas the virulent pneumococci gradually disappear.

SUGGESTIONS FOR A BROADER APPLICATION OF *GAMBUSIA* FOR THE PURPOSE OF MOSQUITO CONTROL IN THE SOUTH.

By SAMUEL F. HILDEBRAND, Ichthyologist, United States Bureau of Fisheries.

Gambusia is particularly efficient in controlling mosquito production in ponds and borrow pits. These waters, since they are artificial bodies, are usually inaccessible to fish through natural channels, and since such waters are nearly always near man's dwelling, they deserve close attention. It should be remembered that a large body of water is not necessarily required to breed many mosquitoes; therefore the small ones must not be overlooked. It is, on the other hand, not unusual to find at times natural standing or sluggish waters which, for reasons unknown, have not become populated with top minnows.

Experiments and observations have shown quite conclusively that a great reduction in mosquito production can be obtained through the introduction of top minnows. Minnows, however, can not perform miracles, and if much vegetation or floatage is present which is slightly submerged, creating places which can not be reached by the fish, mosquito production will result from the inaccessible water. To obtain complete mosquito control, such protection must be removed. However, a great reduction in the production of mosquitoes (but not complete control) may be expected even though plants and floatage are not removed.

In view of these facts, it appears to be of great importance to distribute *Gambusia* to all standing and sluggish waters as far as possible. To accomplish this end, cooperation of the Federal, State, county, and municipal public health organizations is necessary. First, it is important to have on hand a ready and easily available supply of minnows for distribution. Ponds easily accessible by automobile or wagon and well adapted to the propagation of minnows should be selected and used as "hatcheries." Second, the various health organizations should put forth every effort to aid in distributing the fish, and particularly in informing the public and the rural population concerning the value and use of minnows as a health measure. This information may be distributed by—

(a) Signboards or placards, erected at or near the "hatcheries" beside public highways, reading about as follows:

"Top Minnow Hatchery. Mosquito-eating Minnows Free. Apply County Health Officer" (or city or State health officer, as the case may be).

(b) The publication of notices in newspapers.

(c) Placing aquaria with top minnows in public schools, and an occasional talk to the school children.

(d) Placing aquaria with top minnows in a show window uptown, accompanied by an appropriate explanation.

(e) Stocking fountains in public places with *Gambusia* and erecting a signboard or placard with appropriate explanations.

COURT DECISIONS.

COURT UPHOLDS POWER TO QUARANTINE FOR VENEREAL DISEASE.

The power of health authorities to quarantine persons reasonably suspected of being sources of infection of venereal disease is upheld by the Court of Appeals of Alabama.¹

A woman was arrested on a charge of vagrancy, and was quarantined by the health officer of Birmingham. She brought habeas corpus proceedings to secure her discharge, but the court held that "the health officer, under the facts, was authorized to consider petitioner within the class of those reasonably suspected of being sources of infection," as provided by statute.

Regarding the power to quarantine, the court said:

The right of the legislature, under the police power, to establish quarantine to prevent the spread of contagion and infection is too well established by adjudication and grounded in common sense to be questioned or doubted, and governmental agencies, when authorized, may enact and enforce all reasonable ordinances necessary to attain the desired results. To that end persons affected or reasonably suspected of being affected with diseases known to be infectious or contagious may be segregated, or isolated from the public, either in their homes or in hospitals or camps prepared for that purpose, until such time as that they will cease to be a menace to the public, and prisoners under legal charges of crime may be, when so affected, segregated from their fellows. When so quarantined they are subject to such reasonable examination as is necessary to satisfy the health authorities that their release will not endanger the public.

REGULATIONS GOVERNING LICENSING OF BARBERS MUST BE DESIGNED TO PROTECT PUBLIC HEALTH.²

The regulations adopted by the State board of barber examiners of Washington, under authority of the barbers' license law of that State, have been held invalid by the United States District Court for the Western District of Washington, Southern Division, on the ground that they "were arbitrary and capricious and in no way calculated to protect the health of the public."

A barber, who had failed to pass two examinations given by the State board, was imprisoned for working at his trade without being licensed, and he brought habeas corpus proceedings to secure his release. He attacked the constitutionality of the barber law and the

¹ Dowling, Health Officer, v. Harden (88 South., 217). See also Dowling, Health Officer, v. Glass (88 South., 218).

² Timmons v. Morris, Sheriff (271 Fed., 721).

arbitrary exercise of the power conferred on the State board of examiners.

The law had been held constitutional as a health measure by the Supreme Court of Washington in two decisions and the United States Court agreed with these decisions. The court, however, held that the regulations could only be sustained on the ground that they protected the public health, and it decided that, under the system of marking in examinations wherein only 24 points were allotted to subjects related to health while 76 points covered subjects of minor importance so far as health was concerned, the regulations had "no real or substantial relation to the public health," but were "rather designed to defeat those statutory provisions in the barber law for the protection of the public health, to subordinate essentials to nonessentials, and to allow the board scope for purely arbitrary action."

DEATHS DURING WEEK ENDED JUNE 11, 1921.

Summary of information received by telegraph from industrial insurance companies for week ended June 11, 1921, and corresponding week, 1920. (From the "Weekly Health Index," June 14, 1921, issued by the Bureau of the Census, Department of Commerce.)

	Week ended June 11, 1921.	Corresponding week, 1920.
Policies in force.....	46, 876, 186	44, 036, 467
Number of death claims.....	8, 676	7, 482
Death claims per 1,000 policies in force.....	9.7	8.9

Deaths from all causes in certain large cities of the United States during the week ended June 11, 1921, infant mortality, annual death rate, and comparison with corresponding week of preceding years. (From the "Weekly Health Index," June 14, 1921, issued by the Bureau of the Census, Department of Commerce.)

City.	Estimated population, July 1, 1921.	Week ended June 11, 1921.		Average annual death rate per 1,000. ²	Deaths under 1 year.		Infant mortality rate, week ended June 11, 1921. ³
		Total deaths.	Death rate. ¹		Week ended June 11, 1921.	Previous year or years. ⁴	
Akron, Ohio.....	229, 195	29	6.6	(¹) 10.1	7	(¹) 7	67
Albany, N. Y.....	115, 071	28	12.7	C 16.5	3	C 6	67
Atlanta, Ga.....	207, 473	57	14.3	C 18.2	6	C 10	-----
Baltimore, Md.....	752, 863	175	12.1	A 15.5	27	A 27	76
Birmingham, Ala.....	183, 133	57	16.0	A 22.1	5	A 13	-----
Boston, Mass.....	757, 634	195	13.4	A 15.9	32	A 31	86
Bridgeport, Conn.....	149, 967	23	8.0	A 13.0	3	A 5	38
Buffalo, N. Y.....	519, 606	123	12.3	C 10.9	18	C 18	70
Cambridge, Mass.....	110, 444	20	9.4	A 13.1	2	A 3	36
Camden, N. J.....	119, 672	25	10.9		4		-----
Chicago, Ill.....	2, 780, 655	511	9.6	A 13.6	78	A 99	-----
Cincinnati, Ohio.....	403, 418	98	12.7	C 13.8	14	C 11	92
Cleveland, Ohio.....	831, 138	134	8.4	C 9.9	18	C 20	48
Columbus, Ohio.....	245, 358	55	11.9	C 15.7	5	C 8	58
Dallas, Tex.....	165, 282	39	12.3	A 15.7	5	A 4	-----
Dayton, Ohio.....	158, 119	43	14.2	C 11.8	4	C 4	66

¹ Annual rate per 1,000 population.

² "A" indicates data for the corresponding week of the years 1913 to 1917, inclusive. "C" indicates data for the corresponding week of the year 1920.

³ Deaths under 1 year per 1,000 births—an annual rate based on deaths under 1 year for the week and estimated births for 1920. Cities left blank are not in the registration area for births.

⁴ Data based on statistics of 1915, 1916, and 1917.

Deaths from all causes in certain large cities of the United States during the week ended June 11, 1921, infant mortality, annual death rate, and comparison with corresponding week of preceding years. (From the "Weekly Health Index," June 14, 1921, issued by the Bureau of the Census, Department of Commerce.)—Continued.

City.	Estimated population, July 1, 1921.	Week ended June 11, 1921.		Average annual death rate per 1,000.	Deaths under 1 year.		Infant mortality rate, week ended June 11, 1921.
		Total deaths.	Death rate.		Week ended June 11, 1921.	Previous year or years.	
Denver, Colo.....	263,152	60	11.9	A 12.8	8		
Detroit, Mich.....	1,070,450	179	8.7	C 10.4	3	C 40	62
Fall River, Mass.....	120,068	30	13.0	C 10.8	3	C 4	45
Grand Rapids, Mich.....	141,197	22	8.1	C 10.5	3	C 5	51
Houston, Tex.....	144,340	29	10.5		4		
Indianapolis, Ind.....	325,215	69	11.1	C 13.6	6	C 7	47
Jersey City, N. J.....	302,788	65	11.2	C 11.5	10	C 5	
Kansas City, Kans.....	103,884	21	10.5		1		24
Kansas City, Mo.....	338,157	70	10.9	C 14.1	11	C 7	
Los Angeles, Calif.....	611,921	153	13.0	A 12.9	10	A 11	47
Louisville, Ky.....	238,083	66	14.6	C 11.3	3	C 3	35
Lowell, Mass.....	113,757	18	8.3	A 12.8	2	A 6	32
Memphis, Tenn.....	165,389	38	12.0	C 22.3	5	C 7	
Milwaukee, Wis.....	468,386	68	7.6	A 11.7	11	A 22	53
Minneapolis, Minn.....	392,815	74	9.8	C 9.1	14	C 7	80
Nashville, Tenn.....	122,036	38	16.2	C 14.1	1	C 5	
New Bedford, Mass.....	125,012	26	10.8	A 14.7	7	A 5	108
New Haven, Conn.....	167,007	34	10.6	C 15.9	6	C 8	60
New Orleans, La.....	394,657	104	13.7	A 21.3	16	A 23	
New York, N. Y.....	5,751,867	1,070	9.7	C 11.7	139	C 202	55
Newark, N. J.....	424,885	85	10.4	C 13.0	18	C 22	
Norfolk, Va.....	121,260	27	11.6		3		53
Oakland, Calif.....	226,472	47	10.8	A 10.4	4	A 3	51
Omaha, Nebr.....	197,066	51	13.5		9		
Paterson, N. J.....	137,463	34	12.9		4		
Philadelphia, Pa.....	1,866,212	267	10.3	(*) 14.0	50	(*) 62	60
Pittsburgh, Pa.....	602,452	154	13.3	C 12.4	23	C 29	82
Portland, Oreg.....	264,859	55	10.8	C 13.6	1	C 5	10
Providence, R. I.....	239,645	53	11.5	C 14.7	8	C 7	
Richmond, Va.....	175,686	46	13.7	C 17.2	5	C 9	61
Rochester, N. Y.....	305,229	49	8.4	C 15.5	4	C 19	31
St. Louis, Mo.....	786,164	166	11.0	C 11.8	10	C 14	
St. Paul, Minn.....	237,781	42	9.2	C 12.6	3	C 7	30
Salt Lake City, Utah.....	121,595	35	15.0	A 10.8	4		62
San Francisco, Calif.....	520,546	132	13.2	C 12.6	5	C 11	29
Seattle, Wash.....	327,227	53	8.4	A 8.2	6	A 6	50
Spokane, Wash.....	104,442	16	8.0	C 12.0	7	C 1	153
Springfield, Mass.....	135,877	32	12.3		8		121
Syracuse, N. Y.....	177,265	43	12.6	C 12.0	6	C 8	72
Toledo, Ohio.....	253,696	42	8.6	A 13.7	4	A 8	40
Trenton, N. J.....	122,760	27	11.5	A 17.7	9	A 7	
Washington, D. C.....	454,023	110	12.6	A 14.9	9	A 12	53
Wilmington, Del.....	113,408	22	10.1	C 13.6			
Worcester, Mass.....	184,972	47	13.2	C 14.4	8	C 6	86
Yonkers, N. Y.....	103,324	17	8.6	A 10.9	1	A 3	23
Youngstown, Ohio.....	139,432	23	8.6	C 9.7	2	C 8	25

* Data based on statistics of 1915, 1916, and 1917.

MASSACHUSETTS.		NEW JERSEY.	
	Cases.		Cases.
Cerebrospinal meningitis	3	Cerebrospinal meningitis	1
Chicken pox	89	Chicken pox	102
Conjunctivitis (suppurative)	10	Diphtheria	136
Diphtheria	137	Influenza	3
German measles	21	Malaria	3
Influenza	3	Measles	219
Lethargic encephalitis	2	Pneumonia	57
Measles	299	Poliomyelitis	1
Mumps	88	Scarlet fever	143
Ophthalmia neonatorum	18	Smallpox	4
Pellagra	1	Trachoma	1
Pneumonia (lobar)	60	Typhoid fever	7
Scarlet fever	113	Whooping cough	191
Septic sore throat	3		
Trachoma	1	NEW MEXICO.	
Tuberculosis (all forms)	138	Chicken pox	12
Typhoid fever	13	Diphtheria	26
Whooping cough	120	Malaria	2
		Measles	48
MINNESOTA.		Paratyphoid fever	2
Chicken pox	29	Pneumonia	4
Diphtheria	37	Scarlet fever	1
Malaria	1	Smallpox	9
Measles	61	Tuberculosis	109
Pneumonia	1	Typhoid fever	1
Poliomyelitis	1	Typhus fever	18
Scarlet fever	64	Whooping cough	11
Smallpox	97		
Tuberculosis	66	NEW YORK.	
Typhoid fever	9	(Exclusive of New York City.)	
Whooping cough	14	Diphtheria	206
		Influenza	9
MISSISSIPPI.		Lethargic encephalitis	4
Diphtheria	6	Measles	549
Scarlet fever	14	Pneumonia	112
Smallpox	15	Scarlet fever	166
Typhoid fever	20	Smallpox:	
		Georgetown	30
MONTANA.		Scattering	7
Diphtheria	5	Typhoid fever	16
Rocky Mountain spotted or tick fever:		Whooping cough	281
Hamilton	1		
Lo Lo	2	NORTH CAROLINA.	
Scarlet fever	9	Cerebrospinal meningitis	3
Smallpox	17	Chicken pox	30
Typhoid fever	5	Diphtheria	10
		German measles	1
NEBRASKA.		Measles	130
Chicken pox	16	Poliomyelitis	3
Diphtheria	11	Scarlet fever	26
Measles	34	Septic sore throat	4
Mumps	14	Smallpox	44
Scarlet fever:		Typhoid fever	68
Franklin County	13	Whooping cough	253
Scattering	18		
Smallpox:		SOUTH DAKOTA.	
Franklin County	33	Diphtheria	9
Scattering	42	Measles	30
Tuberculosis	1	Scarlet fever	12
Typhoid fever	1	Smallpox	35
Whooping cough	7	Tuberculosis	1
		Typhoid fever	2
		Whooping cough	15

¹ See page 1468.

TEXAS.		Cases.	WEST VIRGINIA—continued.		Cases.
Chicken pox.....		23	Smallpox.....		5
Diphtheria.....		7	Typhoid fever.....		2
Measles.....		50			
Mumps.....		11	WISCONSIN.		
Typhoid fever.....		5	Milwaukee:		
Whooping cough.....		48	Chicken pox.....		39
VERMONT.			Diphtheria.....		23
Chicken pox.....		54	Measles.....		14
Diphtheria.....		1	Scarlet fever.....		6
Measles.....		57	Smallpox.....		5
Mumps.....		3	Tuberculosis.....		14
Pneumonia.....		3	Whooping cough.....		25
Scarlet fever.....		18	Scattering:		
Typhoid fever.....		1	Chicken pox.....		69
Whooping cough.....		33	Diphtheria.....		39
WEST VIRGINIA.			Influenza.....		3
Diphtheria.....		7	Measles.....		67
Measles:			Scarlet fever.....		64
Huntington.....		9	Smallpox.....		64
Scattering.....		6	Tuberculosis.....		9
Scarlet fever.....		5	Typhoid fever.....		3
			Whooping cough.....		64

Reports for Week Ended June 11, 1921.

DISTRICT OF COLUMBIA.		Cases.	KENTUCKY—continued.		Cases.
Chicken pox.....		9	Mumps.....		1
Diphtheria.....		6	Paratyphoid fever.....		1
Measles.....		111	Pneumonia.....		9
Scarlet fever.....		4	Poliomyelitis—Davies County.....		1
Tuberculosis.....		15	Scarlet fever:		
Whooping cough.....		14	Union County.....		12
KENTUCKY.			Scattering.....		7
Chicken pox.....		8	Smallpox:		
Diphtheria.....		16	Union County.....		32
Dysentery.....		14	Warren County.....		13
Influenza.....		1	Scattering.....		9
Lethargic encephalitis—Edmonson County.....		1	Tuberculosis:		
Measles:			Jefferson County.....		13
Jefferson County.....		63	Scattering.....		3
Perry County.....		8	Typhoid fever.....		
Union County.....		10	Whooping cough.....		
Scattering.....		12	.....	

SUMMARY OF CASES REPORTED MONTHLY BY STATES.

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State.	Cerebrospinal meningitis.	Diphtheria.	Influenza.	Malaria.	Measles.	Fellegra.	Poliomyelitis.	Scarlet fever.	Smallpox.	Typhoid fever.
MAY, 1921.										
Connecticut.....	9	174	23	4	328		1	288		53
District of Columbia.....		31	2		799		1	53	13	6
Louisiana.....	3	34	9	106	68	29		23	183	83
Michigan.....		729			350		3	726	562	98
West Virginia.....	2	61	36		290			147	225	47
Wisconsin.....	2	279	92		500		4	670	572	21

PLAGUE.¹
HUMAN CASES OF PLAGUE REPORTED.

Place.	Period covered.	Cases.	Deaths.	Remarks.
California:	1921.			
San Benito County.....	Feb. 7.....	.....	1	
	June 11.....	1	.....

¹ A summary of the reports received of the occurrence of plague and the finding of plague-infected rodents in the United States during 1920 was published in Public Health Reports, Jan. 7, 1921, p. 15.

PLAGUE-INFECTED RODENTS.

Place.	Period covered.	Rodents found plague infected.
California:	1921.	
San Benito County.....	May 15 to June 4.....	* 8
Florida:	Jan. 1 to Apr. 18.....	5
Pensacola.....	Apr. 19 to June 18.....	0
Louisiana:	Jan. 1 to May 26.....	38
New Orleans.....	May 27 to June 18.....	0
Texas:	Jan. 1 to May 23.....	1
Galveston.....	May 29 to June 18.....	0

* Ground squirrels, *Citellus beecheyi*.

TYPHUS FEVER.

Navajo Indian Reservation, Shiprock, N. Mex.—June 15, 1921.¹

According to information dated June 15, 1921, 12 new cases of typhus fever, with one death, had occurred on the Navajo Indian Reservation, near Shiprock, N. Mex., since May 21. One of these new cases occurred on the Crown Point Agency. No cases had been reported off the Reservation to June 15.

Officers of the United States Public Health Service are cooperating with the Office of Indian Affairs, Department of the Interior, in suppressing the outbreak.

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921.

CEREBROSPINAL MENINGITIS.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended June 4, 1921.		City.	Median for previous years.	Week ended June 4, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Alabama:				Minnesota:			
Birmingham.....	0	1	.....	Duluth.....	0	2	.....
California:				New Jersey:			
Oakland.....	0	1	.....	Garfield.....		1	1
San Francisco.....	0	1	1	New York:			
Connecticut:				Buffalo.....	0	1	.....
Bridgeport.....	0	1	.....	New York.....	8	4	.....
Illinois:				Pennsylvania:			
Chicago.....	3	1	1	Philadelphia.....	1	2	.....
Massachusetts:				Texas:			
Boston.....	2	1	.....	Dallas.....	0	1	.....
Michigan:				Virginia:			
Detroit.....	0	1	1	Danville.....	0	1	1
Grand Rapids.....	0	.....	1	Portsmouth.....	0	.....	1
Highland Park.....	0	1	1				

¹ See Public Health Reports, May 27, 1921, p. 1190.

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

DIPHTHERIA.

See p. 1474; also Telegraphic weekly reports from States, p. 1464, and Monthly summaries by States, p. 1467.

INFLUENZA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Alabama:			Massachusetts—Continued.		
Birmingham.....		1	Winthrop.....	1	
Mobile.....		1	Michigan:		
California:			Detroit.....	1	
Oakland.....	1	1	Missouri:		
San Francisco.....	2		Kansas City.....	1	
Colorado:			New Jersey:		
Denver.....		1	Harrison.....	1	
District of Columbia:			New York:		
Washington.....	2		Albany.....	1	
Georgia:			New York.....	11	6
Brunswick.....	3		North Carolina:		
Illinois:			Durham.....		1
Chicago.....	6	2	Salisbury.....		1
Maryland:			Pennsylvania:		
Baltimore.....	2		Philadelphia.....	2	2
Cumberland.....	1		Texas:		
Massachusetts:			El Paso.....		1
Boston.....	1		Virginia:		
Cambridge.....	1		Richmond.....		1
Saugus.....	1				

LEPROSY.

City.	Cases.	Deaths.
Louisiana:		
New Orleans.....	1	

LETHARGIC ENCEPHALITIS.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Louisiana:			New York:		
New Orleans.....	1	1	North Tonawanda.....	1	

MALARIA.

California:			New Jersey:		
Los Angeles.....	1		Passaic.....	1	
Connecticut:			New York:		
Greenwich.....	2		New York.....	3	
Georgia:			North Carolina:		
Atlanta.....	1		Charlotte.....		1
Brunswick.....	16		Texas:		
Savannah.....	3	1	Dallas.....	5	1
Valdosta.....	1				
Louisiana:					
Alexandria.....	8				

MEASLES.

See p. 1474; also Telegraphic weekly reports from States, p. 1464, and Monthly summaries by States, p. 1467.

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

PELLAGRA.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
Alabama:			Virginia:		
Birmingham.....	2	1	Norfolk.....	1	
North Carolina:			Richmond.....		1
Salisbury.....		1			

PNEUMONIA (ALL FORMS).

Alabama:			Massachusetts—Continued.		
Anniston.....	1		Cambridge.....		2
Birmingham.....		5	Chelsea.....	3	1
Montgomery.....	1		Chicopee.....		1
California:			Clinton.....	2	1
Berkeley.....	1		Fall River.....	1	
Los Angeles.....	25	9	Gardner.....		2
Oakland.....		5	Haverhill.....	1	
Riverside.....	1		Lawrence.....		1
Sacramento.....	1		Leominster.....	1	
San Diego.....	6	3	Lowell.....		2
San Francisco.....	11	6	Lynn.....	1	
Santa Barbara.....		1	Malden.....	1	
Colorado:			Medford.....	2	
Denver.....		6	Melrose.....	1	
Connecticut:			New Bedford.....		2
Bridgesport.....		1	Newton.....	2	
Greenwich.....	1		Pittsfield.....	1	
Hartford.....	2	1	Quincy.....	1	
New Haven.....		3	Salem.....		1
New London.....		2	Springfield.....	3	2
Stamford.....	1		Waltham.....		1
Waterbury.....		4	Watertown.....	2	
Delaware:			Winthrop.....		1
Wilmington.....		1	Woburn.....		1
District of Columbia:			Worcester.....		9
Washington.....		12	Michigan:		
Georgia:			Ann Arbor.....	2	1
Atlanta.....		7	Battle Creek.....		1
Macon.....		1	Detroit.....	44	17
Savannah.....		3	Flint.....		1
Illinois:			Hamtramck.....	5	2
Alton.....		1	Highland Park.....	4	2
Blue Island.....	1		Kalamazoo.....		1
Chicago.....	152	27	Muskegon.....		1
Decatur.....		1	Pontiac.....		3
East St. Louis.....		1	Port Huron.....		1
Elgin.....		1	Saginaw.....		3
Galesburg.....	5		Sault Ste. Marie.....	2	1
Jacksonville.....		1	Minnesota:		
Oak Park.....		2	Austin.....		2
Rock Island.....		1	Duluth.....	1	
Indiana:			Minneapolis.....		2
Crawfordsville.....	1		Rochester.....		1
East Chicago.....		1	St. Paul.....		6
Gary.....		2	Missouri:		
Hammond.....		1	Independence.....		1
Indianapolis.....		6	Kansas City.....		7
La Fayette.....		1	St. Joseph.....		1
Terre Haute.....		1	Springfield.....		1
Kansas:			Montana:		
Arkansas City.....	2		Great Falls.....		1
Topeka.....		1	Nebraska:		
Wichita.....		1	Omaha.....		1
Kentucky:			Nevada:		
Covington.....	1		Reno.....	1	
Lexington.....		1	New Jersey:		
Louisville.....	4	2	Atlantic City.....	1	
Louisiana:			Belleville.....	1	
New Orleans.....		10	Clifton.....	1	
Maine:			Elizabeth.....		3
Biddeford.....		3	Garfield.....	1	
Portland.....		1	Hackensack.....	2	
Maryland:			Harrison.....	1	
Baltimore.....	36	8	Hoboken.....	2	2
Cumberland.....	2		Jersey City.....	2	
Massachusetts:			Montclair.....	1	
Amesbury.....	2		Morristown.....		1
Boston.....		10	Newark.....	32	4
Brockton.....	1		Orange.....		3
Brookline.....	5		Passaic.....		4

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

PNEUMONIA (ALL FORMS)—Continued.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
New Jersey—Continued.			Ohio—Continued.		
Paterson.....	2		Cincinnati.....		5
Phillipsburg.....		2	Columbus.....		3
Plainfield.....		1	Dayton.....	1	
Summit.....	1		Kenmore.....	3	
Trenton.....	6	5	Lima.....		1
New York:			Lorain.....	1	
Albany.....	3		Toledo.....		2
Auburn.....		1	Youngstown.....		3
Binghamton.....	3		Oregon:		
Buffalo.....	17	10	Portland.....		3
Cohoes.....		1	Pennsylvania:		
Geneva.....		1	Philadelphia.....	37	31
Ithaca.....	5	1	Rhode Island:		
Jamestown.....	2		Providence.....		4
Middletown.....	1		South Carolina:		
Mount Vernon.....			Charleston.....		2
New York.....	183	98	Texas:		
Niagara Falls.....	3		Dallas.....	3	2
Rochester.....	10	3	El Paso.....		1
Rome.....	1		Utah:		
Schenectady.....	5		Salt Lake City.....		1
Syracuse.....	6	2	Virginia:		
Troy.....	2	1	Norfolk.....		1
White Plains.....	2		Portsmouth.....		2
Yonkers.....	5	2	Richmond.....		4
North Carolina:			Roanoke.....		1
Charlotte.....		2	West Virginia:		
Greensboro.....		1	Charleston.....		1
Winston-Salem.....		1	Huntington.....		1
Ohio:			Wheeling.....		1
Akron.....	3		Wisconsin:		
Barberton.....		1	Kenosha.....		1
Canton.....		1	Madison.....		2

POLIOMYELITIS (INFANTILE PARALYSIS).

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended June 4, 1921.		City.	Median for previous years.	Week ended June 4, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Illinois:				New York:			
Aurora.....			1	New York.....	1	2	
Massachusetts:				Vermont:			
Southbridge.....	0		1	Burlington.....	0	1	
Michigan:				West Virginia:			
Flint.....	0	1		Wheeling.....	0	1	
Montana:							
Great Falls.....		1					

RABIES IN ANIMALS.

City.	Cases.	City.	Cases.
Massachusetts:		Texas:	
Brookline.....	1	Fort Worth.....	1

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued:

TETANUS.

City.	Cases.	Deaths.	City.	Cases.	Deaths.
California:			Louisiana:		
Bakersfield.....	1	.....	New Orleans.....		1
San Francisco.....	1	.....	Nebraska:		
Georgia:			Lincoln.....	1	.....
Savannah.....		1	Omaha.....	2	2
Illinois:			New York:		
Mattoon.....	1	.....	New York.....	1	1

SCARLET FEVER.

See p. 1474; also Telegraphic weekly reports from States, p. 1464, and Monthly summaries by States, p. 1467.

SMALLPOX.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended June 4, 1921.		City.	Median for previous years.	Week ended June 4, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Alabama:				Kansas:			
Birmingham.....	1	23	.....	Atchison.....	1	2	.....
Mobile.....	0	10	.....	Coffeyville.....	1	2	.....
Montgomery.....	0	1	.....	Fort Scott.....	1	3	.....
Tuscaloosa.....	0	1	.....	Hutchinson.....	0	8	.....
Arkansas:				Kansas City.....	1	9	.....
Fort Smith.....	0	1	.....	Parsons.....	4	2	.....
California:				Topeka.....	3	5	.....
Bakersfield.....	0	4	.....	Wichita.....	11	7	.....
Los Angeles.....	1	5	.....	Kentucky:			
Oakland.....	0	1	.....	Louisville.....	1	1	.....
Pasadena.....	0	1	.....	Louisiana:			
Riverside.....	0	9	.....	Alexandria.....	2	8	.....
Sacramento.....	0	4	.....	New Orleans.....	4	16	1
San Francisco.....	2	12	.....	Michigan:			
Colorado:				Battle Creek.....	1	1	.....
Colorado Springs.....	0	1	.....	Benton Harbor.....	0	4	.....
Denver.....	16	23	.....	Detroit.....	10	17	.....
Georgia:				Highland Park.....	1	5	.....
Atlanta.....	11	13	.....	Saginaw.....	0	1	.....
Macon.....	1	1	.....	Minnesota:			
Idaho:				Austin.....		6	.....
Boise.....	4	1	.....	Duluth.....	3	7	.....
Illinois:				Mankato.....	0	2	.....
Alton.....	0	1	.....	Minneapolis.....	23	30	.....
Bloomington.....	0	2	.....	St. Cloud.....	1	3	.....
Centralia.....	0	1	.....	St. Paul.....	6	32	.....
Chicago.....	2	1	.....	Missouri:			
Decatur.....	0	2	.....	Kansas City.....	9	13	.....
East St. Louis.....	3	1	.....	St. Louis.....	4	8	.....
Mattoon.....	0	2	.....	Montana:			
Springfield.....	3	1	.....	Great Falls.....	5	5	.....
Indiana:				Missoula.....	0	3	.....
Bloomington.....	0	1	.....	Nebraska:			
Crawfordsville.....		2	.....	Lincoln.....	5	3	.....
Elkhart.....	2	5	.....	Omaha.....	10	6	.....
Gary.....	0	2	.....	Nevada:			
Indianapolis.....	14	4	.....	Reno.....	1	3	.....
Marion.....	0	3	.....	New Jersey:			
Muncie.....	0	1	.....	Atlantic City.....	0	1	.....
South Bend.....	0	5	.....	Newark.....	0	4	.....
Terre Haute.....	1	2	.....	Trenton.....		2	.....
Iowa:				Union.....		1	.....
Burlington.....	0	2	.....	New York:			
Davenport.....	5	2	.....	North Tonawanda.....		2	.....
Mason City.....	3	5	.....	North Carolina:			
Muscatine.....	1	3	.....	Charlotte.....	0	3	.....
Ottumwa.....		1	.....	Winston-Salem.....	2	6	.....
Sioux City.....	2	11	.....			

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

SMALLPOX—Continued.

City.	Median for previous years.	Week ended June 4, 1921.		City.	Median for previous years.	Week ended June 4, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
North Dakota:				Texas:			
Minot.....		3		Dallas.....	3	1	
Ohio:				Fort Worth.....	10	4	
Akron.....	2	4		Waco.....	0	9	
Canton.....	1	2		Utah:			
Cincinnati.....	2	6		Salt Lake City.....	0	10	
Columbus.....	2	3		Virginia:			
Lancaster.....	0	4		Norfolk.....	0	2	
Marion.....	6	3		Richmond.....	0	2	
Middletown.....	0	1		Washington:			
Newark.....	0	8		Aberdeen.....	1	3	
Sandusky.....	0	2		Bellingham.....	1	2	
Toledo.....	3	7		Seattle.....	3	8	
Zanesville.....	0	1		Spokane.....	6	3	
Oklahoma:				Tacoma.....	1	3	
Oklahoma City.....	12	8		Vancouver.....	0	2	
Pennsylvania:				West Virginia:			
Lebanon.....	0	1		Bluefield.....	5	2	
South Carolina:				Fairmont.....	0	1	
Charleston.....	0	4		Wheeling.....	0	1	
Columbia.....	0	1		Wisconsin:			
South Dakota:				Eau Claire.....	0	3	
Sioux Falls.....	1	1		Madison.....	0	6	
Tennessee:				Manitowoc.....	2	1	
Chattanooga.....	0	3		Marquette.....	1	5	
Knoxville.....	1	1		Milwaukee.....	6	6	
Nashville.....	1	1		Oshkosh.....	2	1	

TUBERCULOSIS.

See p. 1474; also Telegraphic weekly reports from States, p. 1464.

TYPHOID FEVER.

The column headed "Median for previous years" gives the median number of cases reported during the corresponding weeks of the years 1915 to 1920, inclusive. In instances in which data for the full six years are incomplete, the median is that for the number of years for which information is available.

City.	Median for previous years.	Week ended June 4, 1921.		City.	Median for previous years.	Week ended June 4, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Alabama:				Indiana:			
Birmingham.....	4	3		Gary.....	0		1
California:				Kokomo.....	0	1	
Oakland.....	1	1		Kansas:			
Sacramento.....	0	1	1	Hutchinson.....	1	1	
San Bernardino.....	0	1		Lawrence.....	0		1
San Francisco.....	1	3		Topeka.....	0	1	
Santa Barbara.....	0		1	Kentucky:			
Connecticut:				Covington.....	0	1	
Bridgeport.....	0	1		Louisville.....	1	1	
Hartford.....	0	3		Louisiana:			
New Haven.....	1	1		New Orleans.....	3	3	3
Stonington.....		1		Maryland:			
District of Columbia:				Baltimore.....	6	3	1
Washington.....	1	1		Cumberland.....	0		1
Georgia:				Massachusetts:			
Atlanta.....	1	7	2	Arlington.....	0	1	
La Grange.....		1		Boston.....	3	2	
Macon.....	2	1		Fall River.....	2	1	
Savannah.....	0	3		Newton.....	0	1	
Valdosta.....		1		Waltham.....	0	5	1
Illinois:				Michigan:			
Chicago.....	2	4		Detroit.....	5	5	2
Rockford.....	0	1		Flint.....	0	1	

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

TYPHOID FEVER—Continued.

City.	Median for previous years.	Week ended June 4, 1921.		City.	Median for previous years.	Week ended June 4, 1921.	
		Cases.	Deaths.			Cases.	Deaths.
Michigan—Continued.				Pennsylvania—Contd.			
Muskegon.....	0	1	1	Butler.....	0	1	.....
Sault Ste. Marie.....	0	1	1	Easton.....	0	2	.....
Minnesota:				Erie.....	0	1	.....
Duluth.....	0	4	.....	Harrisburg.....	0	1	.....
St. Paul.....	0	2	.....	North Braddock.....	0	1	.....
Missouri:				Philadelphia.....	9	6	1
Kansas City.....	0	1	1	Pittsburgh.....	2	2	.....
St. Louis.....	3	2	.....	Washington.....	0	4	.....
Montana:				South Carolina:			
Billings.....	0	2	.....	Charleston.....	3	.....	1
New Jersey:				Columbia.....	1	2	.....
Clifton.....		1	.....	Tennessee:			
Gloucester.....	0	1	.....	Knoxville.....	0	1	.....
Newark.....	0	.....	1	Nashville.....	3	1	.....
Trenton.....	0	2	.....	Texas:			
New York:				Dallas.....	1	2	.....
New York.....	18	7	1	Fort Worth.....	0	1	.....
Niagara Falls.....	0	4	1	Galveston.....	1	1	.....
North Carolina:				Waco.....	2	.....	1
Charlotte.....	0	1	.....	Virginia:			
Durham.....	1	1	.....	Alexandria.....	1	1	.....
Ohio:				Lynchburg.....	0	1	.....
Akron.....	0	1	.....	Washington:			
Chillicothe.....	0	1	.....	Seattle.....	0	3	.....
Lima.....	0	1	.....	Spokane.....	0	1	.....
Marion.....	0	1	.....	West Virginia:			
Toledo.....	3	1	.....	Wheeling.....	0	1	.....
Oregon:				Wisconsin:			
Portland.....	1	1	.....	Fond du Lac.....	0	1	.....
Pennsylvania:				Marquette.....	0	1	.....
Allentown.....	1	2	.....	Sheboygan.....	1	4	.....

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City.	Population January 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Alabama:										
Birmingham.....	178,270	46	.....	27	.....	.....	.....	4	6	.....
Mobile.....	60,151	24	.....	1	1	1	.....	.....	3	.....
Montgomery.....	43,454	9	.....	.....	.....	.....	.....	.....	1	.....
Tuscaloosa.....	11,996	.....	.....	.....	.....	4	.....	.....	.....	.....
Arizona:										
Tucson.....	20,292	11	.....	.....	.....	.....	.....	.....	1	.....
Arkansas:										
Fort Smith.....	28,811	.....	1	.....	.....	2	.....	.....	.....	.....
Hot Springs.....	11,095	1	.....	.....	.....	.....	.....	.....	.....	.....
Little Rock.....	64,997	.....	.....	2	.....	1	.....	1	.....	.....
North Little Rock.....	14,048	.....	.....	28	.....	.....	.....	.....	.....	.....
California:										
Alameda.....	28,806	6	.....	1	.....	1	.....	2	.....	.....
Bakersfield.....	18,038	4	2	4	.....	1	.....	.....	.....	.....
Berkeley.....	55,886	8	5	2	.....	.....	.....	1	.....	.....
Eureka.....	12,923	1	.....	3	.....	.....	.....	.....	.....	.....
Long Beach.....	55,598	11	1	6	.....	1	.....	1	.....	.....
Los Angeles.....	570,673	176	48	59	.....	12	.....	40	24	.....
Oakland.....	218,361	54	5	1	.....	6	.....	3	2	.....
Pasadena.....	45,354	8	10	9	.....	3	.....	1	1	.....
Richmond.....	16,943	2	.....	.....	.....	1	.....	.....	.....	.....
Riverside.....	19,341	8	.....	.....	.....	1	.....	.....	.....	.....
Sacramento.....	65,557	17	3	1	.....	.....	.....	3	2	.....
San Bernardino.....	18,721	8	.....	1	.....	.....	.....	1	2	.....
San Diego.....	74,683	22	2	56	.....	.....	.....	4	4	.....
San Francisco.....	508,410	121	20	13	1	10	.....	25	8	.....
Santa Barbara.....	19,441	7	.....	.....	.....	.....	.....	5	.....	.....
Santa Cruz.....	16,917	2	1	.....	.....	.....	.....	.....	.....	.....
Colorado:										
Colorado Springs.....	30,105	4	.....	2	.....	.....	.....	10	.....	.....
Denver.....	256,369	60	4	2	19	9	.....	.....	.....	.....

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Popula- tion Janu- ary 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Connecticut:										
Bridgeport.....	143,538	36	4	1	3		12		4	3
Bristol.....	20,620	3	2	2						
Danbury (city).....	18,943	7			2					
Derby.....	11,238	4								
Fairfield (town).....	11,475				4		2			
Greenwich (town).....	22,123				1		1		1	1
Hartford.....	138,035	28	10		6		3		1	3
Manchester (town).....	18,370	2			1		2			
Milford (town).....	10,193	2								
New Haven.....	162,519	21	5				8		15	
New London.....	25,688	10								
Norwalk.....	27,700	10				1				2
Norwich (city).....	22,304	5	1							
Stamford (city).....	35,086				3		2		2	
Stonington (town).....	10,236	1								
Waterbury.....	91,410	18	4		7	1		1	3	2
Delaware:										
Wilmington.....	110,168	24	2				7			1
District of Columbia:										
Washington.....	437,571	109	12		110		8		22	11
Georgia:										
Atlanta.....	200,616	51	3		1	2	10			5
Brunswick.....	14,413	2								
La Grange.....	17,038					16			4	2
Macon.....	52,995	22			3					1
Savannah.....	83,252	40	1				1		2	
Valdosta.....	10,783	1					1			
Idaho:										
Boise.....	21,393	5	1				2			
Illinois:										
Alton.....	24,682	6	1				2			
Aurora.....	36,397	3	3	1	12				2	
Bloomington.....	28,725	3					1		4	
Blue Island.....	11,424	6			1		1	1	1	
Centralia.....	12,491	1								
Chicago.....	2,701,785	538	139	10	386	4	78	5	159	40
Cicero.....	44,995	8	2		8		2			2
Decatur.....	43,918	5			1		7			
East St. Louis.....	66,740	12	2				4			
Elgin.....	27,454	5	1		1				1	1
Evanston.....	37,215	9	1		6					
Forest Park.....	10,768	2								1
Galesburg.....	23,834	9	3		9	1				1
Jacksonville.....	15,713	7								1
Kewanee.....	16,026	3					1			
La Salle.....	13,050	0					1			
Mattoon.....	13,552	2								
Oak Park.....	39,830	9	2		25		4			
Pekin.....	12,086						4			
Rockford.....	65,651	5	1		27		3			
Rock Island.....	35,177	8	2				2			
Springfield.....	59,183	12	1		3		2			
Indiana:										
Bloomington.....	11,595	4	1						1	
Crawfordsville.....	10,139	1			2		2			
East Chicago.....	35,967	9								1
Elkhart.....	24,277	4					3			3
Elwood.....	10,780	0								
Evansville.....	85,264	15	1				2			
Fort Wayne.....	35,549	14	13		14		1		3	
Frankfort.....	11,585	1					1			
Gary.....	55,878	8	3		3		2		1	1
Hammond.....	36,004	12	6	1	1		1			1
Huntington.....	14,000	6	2							
Indianapolis.....	314,194	71	6	1	6		14		13	9
Kokomo.....	30,067	2	1				1			
La Fayette.....	22,486	6					2		1	1
Logansport.....	21,626	4								
Marion.....	23,747	3							1	
Mishawaka.....	15,195	2								
Muncie.....	36,624	7		1	5					
South Bend.....	70,983	6					5		5	
Terre Haute.....	66,063	24	1	1	1		1		1	1

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Popula- tion Janu- ary 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Iowa:										
Burlington	24,057		2							
Davenport	56,727		1				3			
Iowa City	11,257									
Mason City	20,085					2				
Muscatine	16,088						2			
Ottumwa	23,066	1	1							
Sioux City	71,227	5	1				1			
Kansas:										
Arkansas City	11,253	4				6				1
Coffeyville	13,452	1								2
Fort Scott	10,686	3	1		1					
Hutchinson	23,298		3		9		1			
Kansas City	101,177		2		9		1			3
Lawrence	12,456	3			2					
Leavenworth	16,912		1		2					
Parsons	16,028	5			1					2
Salina	15,985	4			1		1			
Topeka	50,022	15								1
Wichita	72,128	12			26		4			2
Kentucky:										
Covington	57,121	14	1		1					1
Lexington	41,534	17			5		3			8
Louisville	234,801	45	6		24		6			12
Louisiana:										
Alexandria	17,510	8			1					
New Orleans	387,219	118	2		1	1	1			16
Maine:										
Auburn	18,985	7					2			
Bangor	25,978						1			
Bath	14,731	3					3			
Biddeford	13,068	13								
Lewiston	34,491	4	1		1		4			1
Portland	69,272	35			1	1				4
Sanford	10,691	6								1
Waterville	13,351		1		2					
Maryland:										
Baltimore	733,826	158	20	1	92		15			20
Cumberland	29,887	6					1			2
Massachusetts:										
Adams	12,967	1								6
Amesbury	10,036	3								1
Arlington	18,665	10			1		1			1
Belmont	10,749	1								
Beverly	22,561	2					2			
Boston	749,090	157	57		117		45			53
Braintree	10,530	4			1					2
Brookton	63,138		5							
Brookline	37,748	8			2					1
Cambridge	109,604	25	14		22		2			7
Chelsea	43,184	7			3					1
Chicopee	33,214	2								
Clinton	12,979	5								
Danvers	11,108				1		1			
Easthampton	11,261				2		1			1
Everett	40,120	7	1		1		1			1
Fall River	120,485	21	4		1		2			4
Gardner	16,971	8								
Greenfield	15,462	1					1			
Haverhill	53,881	14	5	2	1		7			1
Holyoke	69,203	10	1		1		1			1
Lawrence	94,270	12					2			1
Leominster	19,744	4			2		2			1
Lowell	112,479	30	2		2					3
Lynn	98,148	23	7		22		1			3
Malden	49,103	8								
Medford	37,038	5	5		6		3			1
Melrose	18,204	4								
Methuen	15,183	1					1			
New Bedford	121,217	31					1			8
Newburyport	15,618	4								
Newton	46,064	8			2		2			1
North Adams	22,232	2								
Northampton	21,951	8	1		1					1
Pittsfield	41,751	16		1						2

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.
DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Popula- tion Janu- ary 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tubercu- losis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Massachusetts—Continued.										
Plymouth.....	13,045	2								
Quincy.....	47,876	5			26		1		2	
Salem.....	42,539	10	1		1				2	
Saugus.....	16,874	1	1		8					
Southbridge.....	14,245	2			6					
Springfield.....	129,563	18	4	1	1				4	1
Taunton.....	37,137	17	1				2		2	1
Wakfield.....	13,025	0			19		1			
Waltham.....	39,915	5	3		2					
Watertown.....	21,457	3	1		2		1		1	1
West Springfield.....	13,443	3			10		2			
Westfield.....	18,694	3								
Winthrop.....	15,455	4			4					
Woburn.....	18,574	7								
Worcester.....	179,784	48				1	1		3	7
Michigan:										
Ann Arbor.....	19,516	2								
Battle Creek.....	36,164		1							
Detroit.....	983,739	195	67	7	51		53	1	46	15
Flint.....	91,599	9	5				4			1
Grand Rapids.....	137,634	20							2	1
Hamtramck.....	48,615	7	2		3					
Holland Park.....	46,499	17	6	1	5		3			
Holland.....	12,166	1								
Kalamazoo.....	48,658	16	1				3	1	1	1
Marquette.....	12,718	3							1	1
Muskegon.....	38,570	10	1				1			
Pontiac.....	34,272	6					2	1	2	
Port Huron.....	25,944	6	3		1		2			
Saginaw.....	61,903	22	6				2			2
Sault Ste. Marie.....	12,096	5					1			1
Minnesota:										
Austin.....	10,118	4								
Duluth.....	98,017	18	1		8		4			
Mankato.....	12,469	1								
Minneapolis.....	390,562	74	9	1	15		30	1	18	10
Rochester.....	13,722	14			18				1	
St. Cloud.....	18,873		1							
St. Paul.....	234,565	39	4		5		8		13	6
Missouri:										
Independence.....	11,656	4			1	1				
Kansas City.....	321,410	81	4		34				5	9
St. Joseph.....	77,930	34	1				1			
St. Louis.....	772,897	172	34	1	8		49	3	37	9
Springfield.....	38,631	10								2
Montana:										
Billings.....	15,100	3								
Great Falls.....	24,121	5			4		1			
Missoula.....	12,668	1			1					
Nebraska:										
Lincoln.....	54,934	10			1					
Omaha.....	121,601	33	1		7		5			3
Nevada:										
Reco.....	12,016	3								
New Hampshire:										
Berlin.....	16,104	3	1							
Concord.....	22,167	1							2	
Dover.....	13,029	5								
Keene.....	11,210	1			2		2		1	
Manchester.....	78,384	12	3				1		3	1
New Jersey:										
Asbury Park.....	12,460	5								
Atlantic City.....	50,682	12	1		8		5		3	
Bayonne.....	76,754		8		1		8		1	
Belleville.....	15,660								2	
Bloomfield.....	22,019	2	1		2		2		1	
Clifton.....	26,470	3			4		1	1	1	
Elizabeth.....	85,682		6		9		11		5	2
Englewood.....	11,627	2								
Garfield.....	19,381	5	1							
Gloucester City.....	12,162		1		1					
Hackensack.....	17,667	3	1	1			8			
Harrison.....	15,721		1				1			
Hebbron.....	68,166	12	4				2		2	1

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Population January 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
New Jersey—Continued.										
Irvington.....	25,490		2		2		4		1	
Jersey City.....	297,884		17		10		13		4	
Kearny.....	26,724	3			3		2		1	
Montclair.....	28,310	4	3		4				1	
Morristown.....	12,548	2					3			
New Brunswick.....	32,779		12				1			
Newark.....	414,216	81	17		40		29		19	7
Orange.....	33,288	6			50		1			
Passaic.....	63,824	17	3		3		2		5	
Paterson.....	135,866		3		8		2		5	
Perth Amboy.....	41,707	3	8				2		2	
Phillipsburg.....	16,923	6					2		1	1
Plainfield.....	27,700	5	2				4		1	
Rahway.....	11,042	6					2			
Summit.....	10,174	2	1				2			
Tranton.....	119,289	37	2	1	16		5		3	6
Union.....	20,651		2		1		1			
West Hoboken.....	40,088		1				3		1	
West New York.....	29,926		6	1	1		5			
West Orange.....	15,573	1			9				1	
New York:										
Albany.....	113,344		1		25		3		4	
Auburn.....	36,192	9					6			
Binghamton.....	66,800	7	6				4		1	
Buffalo.....	506,775	122	35	1	62		24	2	22	12
Cohoes.....	22,987	2								
Geneva.....	14,648	3								
Glens Falls.....	16,638	4								
Hudson.....	11,745	2								
Ithaca.....	17,004	3					1			
Jamestown.....	38,917	11	2		88				1	1
Lockport.....	21,308	3	4		5		1		1	
Middletown.....	18,420		1		1		1			
Mount Vernon.....	42,726	7	1		1		9		1	1
Newburgh.....	30,366	12			1					
New York.....	5,621,151	1,208	288	27	221	5	279	3	1,214	1,111
Niagara Falls.....	50,760	10	7				13			
North Tonawanda.....	15,482	3	10							
Ogdensburg.....	14,609	5								
Olean.....	20,506	10	2				2			
Peekskill.....	15,838	2	1		1					1
Port Chester.....	16,573	1			10					
Rochester.....	295,750	88	34	3	1		19	1	15	8
Rome.....	26,341		6		12					
Saratoga Springs.....	13,181	7			2				2	2
Schenectady.....	88,723	21			10		1		2	3
Syracuse.....	171,717	40	11		41		6		4	2
Troy.....	72,013	18							3	3
White Plains.....	21,031	3			1		1		2	
Yonkers.....	100,226	14	1		7		7	1		3
North Carolina:										
Charlotte.....	46,338	18								1
Durham.....	21,719	7			3				1	
Greensboro.....	19,831	5								
Rocky Mount.....	12,742	8								
Salisbury.....	13,884	16								1
Wilmington.....	33,372	16			3					1
Winston-Salem.....	48,395	11			1	1			6	1
North Dakota:										
Minot.....	10,476	2	1							
Ohio:										
Akron.....	208,435		6		8				13	
Alliance.....	21,603	6								
Barberton.....	18,811	5	1						1	
Bucyrus.....	10,425	3								
Canton.....	87,091	13	13				4		1	
Chillicothe.....	15,831	1					2			
Cincinnati.....	401,247	91	18		15		11		31	15
Columbus.....	237,031	60	9	1			4		2	5
Dayton.....	152,559	30	3		3		2		1	
East Cleveland.....	27,292	5	2				1		1	
Findlay.....	17,021	1	1							
Hamilton.....	39,675	9					1			
Ironton.....	14,007	6	1		1					
Kenmore.....	12,683				7					

¹ Pulmonary tuberculosis only.

CITY REPORTS FOR WEEK ENDED JUNE 4, 1921—Continued.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Continued.

City.	Popula- tion Janu- ary 1, 1920, subject to correction.	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuber- culosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Rhode Island:										
Cranston.....	29,407	6			2					
Cumberland (town).....	10,077						1			
Newport.....	30,355	4	2			5			1	
Pawtucket.....	64,248	12	3						1	
Providence.....	237,595	63	7		18	1	10		5	
South Carolina:										
Charleston.....	67,957	31					1			3
Columbia.....	37,524		2		12					
South Dakota:										
Sioux Falls.....	25,176	7	1				1			
Tennessee:										
Chattanooga.....	57,895		1		4				3	
Knoxville.....	77,818		2		10		1		5	5
Nashville.....	118,342	34	1		12		8		2	
Texas:										
Beaumont.....	40,422	8			6					2
Corpus Christi.....	10,522	3			1					
Dallas.....	158,976	44	2		33			6	4	
El Paso.....	77,543	45		2			5		5	
Fort Worth.....	106,482		4		1		2		3	
Galveston.....	44,255	12								2
Waco.....	38,500	13								
Utah:										
Salt Lake City.....	118,110	28	9				2			2
Vermont:										
Barre.....	10,008						2			
Burlington.....	22,779	6	4							
Rutland.....	14,954	0			1					
Virginia:										
Alexandria.....	18,050	7			1					1
Danville.....	21,533	14			1					
Lynchburg.....	29,955	10			53		3			1
Norfolk.....	115,777				7		4			
Petersburg.....	31,002	16			10				5	1
Portsmouth.....	54,337	11	1		1					1
Richmond.....	171,637	46			18		2		45	9
Roanoke.....	50,842	9			14					1
Washington:										
Bellingham.....	25,570				1					
Seattle.....	315,652						3			
Spokane.....	104,437		1		21		2			
Tacoma.....	96,935				7				1	
Walla Walla.....	15,503						1			
Yakima.....	18,539				1					
West Virginia:										
Bluefield.....	15,282		1		2					
Charleston.....	39,638	8					4			1
Fairmont.....	17,851		1				1			
Huntington.....	50,177	19			1					1
Morgantown.....	12,127		1				1			
Moundsville.....	10,669	1			3					
Parkersburg.....	20,053	1	1							
Wheeling.....	54,322	7	2		4		2			
Wisconsin:										
Appleton.....	19,531		1		1		9	1		
Belaire.....	21,284	3								
Eau Claire.....	20,580		1		1		1			
Fond du Lac.....	23,427	1	2							
Green Bay.....	21,577	3	2		1				1	
Janesville.....	18,293	3					1			
Kenosha.....	43,172	6	1		7					
Madison.....	38,373	12			4		3			
Manitowoc.....	17,533		1							
Marinette.....	13,810				4					
Milwaukee.....	457,147		7		6		18		15	
Oshkosh.....	33,182	5	1				1		9	
Racine.....	58,593	5								
Sheboygan.....	30,955						3			
Superior.....	39,824	9			1		2			
Wausau.....	14,631								1	
Wyoming:										
Cheyenne.....	13,829	3					4			

FOREIGN AND INSULAR.

CUBA.

Communicable Diseases—Habana.

Communicable diseases have been notified at Habana as follows:

Disease.	May 21-31, 1921.		Remain- ing under treatment May 31, 1921.	Disease.	May 21-31, 1921.		Remain- ing under treatment May 31, 1921.
	New cases.	Deaths.			New cases.	Deaths.	
Chicken pox.....	6	.....	11	Paratyphoid fever.....	.....	.....	1
Diphtheria.....	1	.....	.....	Scarlet fever.....	1	.....	3
Leprosy.....	1	.....	1 11	Smallpox.....	.....	.....	1
Malaria.....	16	1	* 31	Typhoid fever.....	11	4	* 21
Measles.....	1	.....	.....		

¹ On May 25, 4 cases were transferred to other municipalities.

² From the interior, 21.

³ From the interior, 14; from abroad, 1.

JAMAICA.

Infectious Disease (Alastrim or Kaffir Pox).

During the week ended May 14, 1921, 352 new cases of alastrim or Kaffir pox were reported in the island of Jamaica.

MEXICO.

Plague—Tampico.

During the 10-day period ended June 17, 1921, 48 cases of plague were reported at Tampico, Mexico, with a total from January 1, 1921, of 119 cases. The last case was reported June 9, 1921.

PORTO RICO.

Plague-Infected Rats.

During the week ended May 28, 1921, three rats, previously examined, were reported found plague infected. Of these rats, one was taken, May 16, at Rio de Piedras, and two were taken, May 21, 1921, at Manati.

UNION OF SOUTH AFRICA.

Plague—Typhus Fever.

During the week ended April 16, 1921, plague was reported present in the Union of South Africa with a number of new cases, and fatal termination of a case notified during the previous week in the Bothaville area of the Kroonstad district, Orange Free State, was reported.

During the week ended April 16, 1921, fresh outbreaks of typhus fever were reported in the Uitenhage district, Cape Province, and outbreaks were reported being dealt with at numerous localities in the Cape Province, at two localities in Natal, and at two localities in the Orange Free State.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER.

Reports Received During Week Ended June 24, 1921.¹

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
India.....				Feb. 20-26, 1921: Deaths, 1,293.
Calcutta.....	May 1-7.....	59	44	
Karachi.....	May 1-7.....	1		
Rangoon.....	Apr. 18-23.....	2	1	
Philippine Islands:				
Manila.....	Apr. 24-May 7.....	8		
Provincio—				
Laguna.....	Apr. 3-9.....	1		

PLAGUE.

Ceylon:				
Colombo.....	Apr. 17-30.....	4	5	
India.....				Apr. 17-23, 1921: Cases, 1,534; deaths, 1,310.
Bombay.....	Apr. 17-23.....	113	89	
Karachi.....	May 1-7.....	2		
Madras Presidency.....	May 1-7.....	73	41	
Rangoon.....	Apr. 17-23.....	35	34	
Mexico:				
Tampico.....	June 4-17.....	48		Total from Jan. 1, 1921: Cases, 119.
Porto Rico:				May 22-28, 1921: Three plague rats reported found.
Manati.....	May 16.....	1		
Rio de Piedras.....	May 21.....	2		
Straits Settlements:				
Singapore.....	Apr. 10-30.....	6	6	
Union of South Africa:				Apr. 10-16, 1921: Many new cases reported.
Orange Free State—				Case previously reported.
Kroonstad district.....	Apr. 16-16.....		1	

SMALLPOX.

Canada:				
Ontario—				
London.....	May 22-June 4.....	3		
Saskatchewan—				
Regina.....	May 29-June 4.....	3		
Ceylon				
Colombo.....	Apr. 24-30.....	1	1	
Colombia:				
Santa Marta.....	May 22-28.....			Present.
China:				
Manchuria—				
Mukden.....	Apr. 18-23.....			Present.
Tientsin.....	Apr. 24-30.....	6		
Chosen (Korea):				
Fusan.....	Apr. 1-30.....	6		
Gensan.....	do.....	17	7	
Seoul.....	do.....	3	1	
Cuba:				
Santiago.....	May 20-30.....	20		
Haiti:				
Cape Haitien.....	May 8-28.....	177	2	
India.....				Feb. 20-26, 1921: Deaths, 515.
Bombay.....	Apr. 18-23.....	41	25	
Calcutta.....	Apr. 1-7.....	1	1	
Karachi.....	do.....	1		
Madras.....	do.....	11	5	
Rangoon.....	Apr. 18-23.....	4	1	

¹ From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received During Week Ended June 24, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Italy:				
Catania.....	May 9-22.....	3		In Province.
Messina.....	Apr. 25-May 1.....	1		In Province, 3.
Palermo.....	May 4-17.....	5		
Japan:				
Nagasaki.....	May 9-22.....	3	1	Mar. 28-May 8, 1921: Cases, 43; deaths, 6.
Java:				
West Java—				
Bandoeng.....	Apr. 15-21.....	2		
Batavia.....	do.....		1	
Lebak.....	do.....	6	2	
Pandeglang.....	do.....	2		
Jugoslavia.....				Feb. 14-26, 1921: Cases, 196; deaths, 59.
Mexico:				
Mexico City.....	May 8-14.....	40		Including municipalities in Federal district.
San Luis Potosi.....	May 29-June 4.....		1	
Newfoundland:				
St. John's.....	May 28-June 3.....	1		
Portuguese East Africa:				
Lourenco Marques.....	Apr. 24-30.....	3	1	
Spain:				
Valencia.....	May 15-21.....	1		
Switzerland:				
Zurich.....	May 8-14.....	4		
Syria:				
Aleppo.....	May 15-21.....			Present.
Tunis:				
Tunis.....	May 14-20.....	1	3	
Union of South Africa:				
Cape Province.....	Apr. 10-16.....			Outbreaks.
Orange Free State.....	do.....			Do.

TYPHUS FEVER.

Algeria:				
Oran.....	May 10-20.....	17	5	
Japan:				
Nagasaki.....	May 2-22.....	17	3	
Jugoslavia.....				Feb. 14-26, 1921: Cases, 109; deaths, 15.
Mexico:				
Mexico City.....	May 8-14.....	15		
San Luis Potosi.....	May 29-June 4.....			Present.
Syria:				
Beirut.....	May 1-10.....	1		
Union of South Africa:				
Cape Province.....	Apr. 10-16.....			Outbreaks.

Reports Received from Jan. 1 to June 17, 1921.

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
China:				
Canton.....	Nov. 1-30.....	7	6	
Changsha.....	Nov. 29.....			Present.
Chungking.....	do.....			Do.
Chosen (Korea).....				Aug. 1-Dec. 2, 1920: Cases, 24,017; deaths, 13,329.
India.....				Sept. 28-Oct. 9, 1920: Deaths, 2,672. Oct. 31-Dec. 11, 1920: Deaths, 7,184. Jan. 2-Feb. 19, 1921: Deaths, 8,465.
Bombay.....	Dec. 5-11.....	2	2	
Do.....	Jan. 16-Feb. 26.....	4	2	
Calcutta.....	Oct. 31-Dec. 25.....	321	283	
Do.....	Dec. 25-Apr. 30.....	1,387	1,159	
Madras.....	Dec. 12-18.....	77	44	
Do.....	Dec. 28-Apr. 30.....	314	115	
Rangoon.....	Nov. 28-Dec. 25.....		9	
Do.....	Dec. 28-Apr. 18.....	42	37	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

CHOLERA—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Indo-China.....				July 1-31, 1920: Cases, 136; deaths, 96.
Saigon.....	Dec. 27-Feb. 27...	7	4	Including surrounding country.
Japan:				
Taiwan Island (Formosa)...	Nov. 11-Dec. 31...	219	93	
Do.....	Jan. 1-20.....	2		
Java:				
West Java—				
Bandoeng.....	Oct. 29-Nov. 11.....	2	1	
Batavia.....	Nov. 25-Dec. 1.....	1		
Philippine Islands:				
Manila.....	Nov. 7-Dec. 25.....	9		
Do.....	Jan. 9-Apr. 16.....	22		
Provinces—				
Bulacan.....	Apr. 3-9.....	1	1	
Cagayan.....	Oct. 3-Nov. 20.....	11	9	
Mindoro.....	Jan. 9-15.....	4		
Occidental Negros.....	do.....	1		
Samar.....	Aug. 1-7.....	1	1	
Sorsogon.....	Jan. 2-8.....	1		
Poland.....				Oct. 1-31, 1920: Cases, 26; deaths, 13. Mar. 15, 1921: Cases present, 86 among prisoners, 8 in civil population; 2 among military.
Eastern frontier—				Present.
Bialystok.....	Dec. 16.....			
Galicia.....	Nov. 1-30.....	19	11	
Grodno.....	do.....			Do.
Olitza.....	do.....			Do.
Posen.....	do.....			Present in Russian prison camp, Mar. 1, 1921: Cases, 31.
Stralkowo.....	do.....			
Strelno.....	do.....	1	1	
Warsaw.....	Oct. 1-31.....	2		In district.
Do.....	Dec. 16.....	5		Nov. 1-30, 1920: Cases, 7; deaths, 2.
Russia:				
Caucasus.....				May 19, 1921: Reported in several localities.
Lithuania.....				Feb. 19, 1921: Cases reported, 35; mortality, 30 per cent.
Latvia—				Present.
Riga.....	Jan. 22.....			
Moscow—				
Kolomna.....	May 19.....			Do.
Rostoff on Don.....	do.....			Do.
Ukraine.....	do.....			Reported in several localities.
Siam:				
Bangkok.....	Oct. 9-Nov. 7.....	7	1	
Do.....	Dec. 26-Apr. 2.....	8	2	

PLAGUE.

Algeria:				
Algiers.....	Nov. 1-Dec. 31.....	3	1	
Do.....	Jan. 1-31.....	3	1	
Oran.....	Mar. 11-20.....	2	1	Dec. 20, 1920: 1 case.
Argentina:				
Rosario.....	Feb. 1-28.....		3	Jan. 1-31, 1921: 3 plague rodents found.
Azores:				Total, Oct. 1-Dec. 10, 1910: Cases, 149; deaths, 49. In vicinity of Ponta Delgada.
St. Michaels.....				
Ponta Delgada.....	Feb. 5-11.....	1		
Brazil:				
Bahia.....	Oct. 31-Dec. 18.....	6	4	
Do.....	Dec. 26-Mar. 12.....	14	4	
Ceara.....	Oct. 17-Feb. 5.....		16	
Pernambuco.....	Oct. 18-Dec. 5.....	1	3	
Porto Alegre.....	Nov. 14-Dec. 11.....		2	
Do.....	Dec. 23-Feb. 19.....		7	
Rio de Janeiro.....	Feb. 15-21.....	1		
British East Africa.....				Outbreak, Nov. 8, 1920: Cases reported, 1,057.
Kenya Colony—				Present.
Kisumu.....	Oct. 31-Dec. 25.....			
Do.....	Dec. 26-Mar. 26.....			Apr. 3-9, 1921: Cases, 4; deaths, 3.
Mombassa.....	Oct. 31-Dec. 25.....	2	2	
Do.....	Dec. 26-Jan. 15.....			Present.
Nairobi.....	Oct. 31-Dec. 25.....	16	11	
Do.....	Jan. 2-Feb. 5.....	19	15	Pneumonic, present.
Uganda.....	July 1-Dec. 31.....	192	169	Entire protectorate.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

PLAGUE—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Ceylon:				
Colombo.....	Nov. 7-Dec. 18....	18	60	
Do.....	Jan. 16-Apr. 16....	124	108	
Chile:				
Antofagasta.....	July 9-Dec. 29....	15	2	Year 1920: Cases, 24.
Do.....	Dec. 27-Feb. 5....	3		
China:				
Amoy.....	Apr. 3-9.....	1	1	
Chihli Province.....				Mar. 11, 1921: Present on Tientsin & Pukow R. R., 70 miles east of Tientsin. Pneumonic Reappearance of plague reported Apr. 12, 1921. Mar. 14, 1921: Reported in 15 localities with 100 fatal cases. Total to Apr. 5, 1921: Deaths, 243. Six districts infected April, 1921.
Hokien district.....	Apr. 30.....		100	Estimated.
Hsien-shien.....				In April, 1921, 48 cases.
Peking.....	Jan. 25.....		1	In Chinese quarter.
Tachang district.....				April, 1921, present in a few river villages.
Tsin-chien district.....	Apr. 28-29.....	35	2	In April, 1921, 42 deaths.
Hongkong.....	Nov. 7-Dec. 18....	6	6	
Do.....	Jan. 9-Feb. 12....	6	6	
Hwangsein.....	Feb. 12.....			A few cases reported.
Kwangtung Province.....	Dec. 29.....			Reported present in Tapu district. Mar. 7, 1921: Recurrence.
Manchuria Province—				
Changchun.....	Feb. 18.....	15		To Apr. 20, 1921: Cases, 42.
Harbin.....	Feb. 2-Apr. 9....	1,319		West of Harbin, Feb. 7, 1921, 400 fatal cases reported. Feb. 14, 1921, fatal cases, 1,200. To Mar. 14, 1921: 4,000 fatal cases. Pneumonic. Fatal cases reported daily, about 40. Apr. 13, improving; east of Harbin, more serious.
Kirin.....				To Apr. 20, 1921: Cases, 19.
Koupangtzu.....				To Apr. 20, 1921: Cases, 18.
Mukden.....	Feb. 20-26.....			Prevalent. Apr. 20, 1921, 3 cases.
Tsitsihar.....	Feb. 2-Mar. 10....			Present.
Sang Yuan.....	Mar. 3.....		50	In northern Shantung Province. Two plague rats found, Dec. 20 and Dec. 31, 1920.
Shanghai.....				
Ecuador:				
Guayaquil.....	Nov. 16-Dec. 31....	111	36	
Do.....	Jan. 1-Apr. 30....	225	77	
Egypt:				
Cities—				Jan. 1-Dec. 30, 1920: Cases, 462; deaths, 289. Jan. 1-May 19, 1921: Cases, 115; deaths, 53.
Alexandria.....	Jan. 17-May 9....	34	11	
Port Said.....	Oct. 22-28.....	1	1	
Do.....	Jan. 22.....	1	1	
Suez.....	Nov. 18-27.....	10	3	
Do.....	Jan. 5-May 3....	21	18	Pneumonic, 6 cases; septicemic, 1 case.
Provinces—				
Assiout.....	Nov. 24.....	3	2	
Do.....	May 3.....	1		
Gharbiah.....	Apr. 7-9.....	1		
Girgeh.....	May 7.....	3		
Minieh.....	Feb. 14-Mar. 3....	5	1	
France:				
Marseille.....	June-Aug. 31....	58	20	
Paris.....	June-Oct. 15....	50	11	In suburbs, June-Nov. 2, 1920: Cases, 38; deaths, 19.
Do.....				Jan. 1-13, 1921: Cases, 3; deaths, 1. (Suspect.)
Great Britain:				
Dublin.....				1 case reported Dec. 15, 1920: date of occurrence, Oct. 18, 1920.
Liverpool.....				Plague-infected rat found, period Nov. 28-Dec. 11, 1920.
Greece:				
Kavala.....	Oct. 29-Nov. 7....	2		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

PLAGUE—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
India				Oct. 24-Dec. 25, 1920: Cases, 21,376; deaths, 14,574. Jan. 2-Apr. 16, 1921: Cases, 60,219; deaths, 48,415.
Bombay.....	Nov. 28-Dec. 25.....	6	6	
Do.....	Dec. 26-Apr. 16.....	428	317	
Calcutta.....	Nov. 14-20.....	45	44	
Do.....	Jan. 30-Apr. 30.....	28	24	
Karachi.....	Dec. 25-31.....	2	2	
Do.....	Mar. 27-Apr. 30.....	34	40	
Madras.....	Dec. 5-25.....	7	4	
Do.....	Jan. 9-29.....	3	1	
Madras Presidency.....	Nov. 14-Dec. 25.....	4,349	2,991	
Do.....	Dec. 26-Apr. 30.....	11,075	8,044	
Rangoon.....	Oct. 31-Dec. 25.....	30	28	
Do.....	Dec. 26-Apr. 16.....	364	344	
Indo-China				July 1-31, 1920: Cases, 98; deaths, 74.
Saigon.....	Dec. 27-Mar. 20.....	9	5	Including surrounding country. Mar. 21-Apr. 8, 1921: Two plague rats.
Java:				
West Java—				
Batavia.....	Nov. 21-Dec. 1.....	3	3	
Do.....	Jan. 13-26.....	1	3	Mar. 31-Apr. 6, 1921: One plague rat found.
Jugoslavia:				
Cattaro.....	Feb. 23.....	3		Among French troops.
Madagascar:				
Tamatave.....	Mar. 1-Apr. 9.....	80	49	Mar. 8-26, 1921: Cases, 75; deaths, 46.
Mesopotamia:				
Bagdad.....	Oct. 1-31.....	25	7	
Do.....	Feb. 1-Mar. 31.....	6	4	
Mexico:				
Carbonera.....	Dec. 5-20.....	3	1	State of San Luis Potosi. Dec., 1920-Feb. 12, 1921: Cases, 24.
Do.....	Dec. 26-Jan. 8.....	3		
Carritos.....	Dec. 5-20.....	7	8	State of San Luis Potosi.
Do.....	Dec. 26-Feb. 5.....	5	5	
Tampico.....	Mar. 23-May 30.....	42	2	Total plague cases, Jan. 1-May 30, 1921: 71.
Vera Cruz.....				Mar. 21-Apr. 10, 1921: Four plague-infected rodents found Mar. 14, 1921: Rodent plague present.
Morocco:				
Tangiers.....	Apr. 25.....			Reported present.
Paraguay:				
Asuncion.....	Feb. 4.....	1	1	
Persia:				
Kermanschah.....	Jan. 4.....			Present in vicinity.
Peru				Year 1920: Cases, 758; deaths, 392. Jan.-Feb. 28, 1921: Cases, 141; deaths, 71.
Departments—				
Arequipa.....	Jan. 1-Dec. 31.....	51	29	
Ancash.....	do.....	23	10	
Cajamarca.....	do.....	39	20	
Callao (Provincia).....	do.....	61	30	
Lambayeque.....	do.....	53	19	
Libertad.....	do.....	174	72	
Lima.....	do.....	153	80	
Piura.....	do.....	204	132	
Callao-Lima.....				Jan. 1-31, 1921: Cases, 8; deaths, 2.
Callao.....	Feb. 1-15.....	2		
Libertad.....	do.....	1		
Trujillo-Salaverry.....	Dec. 27-Apr. 2.....	25	8	
Lima.....	Feb. 1-15.....	14	4	
Piura.....	do.....	21	10	
Puerto Rico:				Total plague cases from beginning of outbreak to May 24, 1921, 22; total plague-infected rats found, 80.
Carolina.....	Apr. 17-30.....	2	1	
San Juan.....	Feb. 18-25.....	7	2	
Portugal:				
Lisbon.....	Oct. 2-Nov. 17.....	93	27	
Do.....	Feb. 4.....	1		
Portuguese West Africa:				
Angola—				
Loanda.....				Mar. 18-Apr. 8, 1921: Rat plague present.
Guinea.....	May 24.....			Present.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.**Reports Received from Jan. 1 to June 17, 1921—Continued.****PLAGUE—Continued.**

Place.	Date.	Cases.	Deaths.	Remarks.
Russia:				
Batum.....	Nov. 24-Dec. 3.....	38		Epidemic outbreak.
Siberia—				
Vladivostok.....	Apr. 22.....			Prevalent. A few deaths among Chinese.
Senegal:				
Dakar.....	June 11.....			Rodent plague present.
Siam:				
Bangkok.....	Dec. 5-11.....	1	1	
Do.....	Mar. 13-Apr. 2.....	11	11	
Straits Settlements:				
Singapore.....	Oct. 31-Nov. 6.....	1	1	
Do.....	Feb. 13-Apr. 9.....	6	7	
Tunis:				
Ben Gardane.....				June-July, 1920: Cases, 6. November-December, 1920: Cases, 10, in surrounding territory.
Zarzis.....	Jan. 25.....	1		Jan. 15, 1921: 10 cases notified in vicinity. (Corrected report received Mar. 30, 1921.) Apr. 26, 1921: Outbreak in vicinity reported. Apr. 23: Cases, 23; deaths, 8.
Turkey:				
Constantinople.....	Nov. 21-27.....	1	2	
Union of South Africa:				
Orange Free State—				
Hoopstad district.....	Nov. 23-Dec. 18.....	3	1	1 European, 2 natives. On Vryheid Farm. (Public Health Reports, June 23, 1920, p. 1560.)
Do.....	Jan. 23-Mar. 26.....	3	1	European and natives. On farms.
Kroonstad district.....	Jan. 23-Apr. 9.....	14	6	On farms. Three cases, 1 death, European. Plague-infected wild rodents found.
Uruguay:				
Montevideo.....	Feb. 1-28.....	1	1	
On vessel:				
S. S. Kronprincessan Victoria.	Jan. 15.....			At Stockholm, Sweden. Rat plague found. Vessel left Buenos Aires, Argentina, Nov. 17, 1920. Stopped at Goteborg and Malmo, Sweden. Left Malmo Jan. 11, 1921. Rats found dead Jan. 13, 1921, at Stockholm.
S. S. Mausourah.....	May 8.....	1		At Suskim, Egypt, from Suez via Port Sudan.

SMALLPOX.

Algeria:				
Algiers.....	Jan. 1-31.....	5		
Argentina:				
Rosario.....	Mar. 1-31.....	1		
Austria.....				Aug. 29-Dec. 25, 1920: Cases, 75.
Azores:				
Ponta Delgada.....	Dec. 18-24.....	7		
Bolivia:				
La Paz.....	Oct. 1-Dec. 31.....	19	7	
Do.....	Jan. 31-Mar. 31.....	14	7	
Brazil:				
Bahia.....	Oct. 31-Dec. 25.....	6		
Do.....	Jan. 8-Apr. 16.....	5		
Pernambuco.....	Oct. 18-Dec. 19.....	102	2	
Do.....	Dec. 27-Mar. 27.....	53	1	
Rio de Janeiro.....	Oct. 21-Dec. 25.....	112	26	
Do.....	Dec. 26-Apr. 9.....	25	6	
Sao Paulo.....	Dec. 13-19.....	1	1	
Do.....	Dec. 26-Jan. 2.....		1	
British East Africa:				
Kenya Colony—				
Mombasa.....	Jan. 23-29.....	1		
Uganda.....	Dec. 1-31.....	4	2	May 1-June 30, 1920: Cases, 272.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Bulgaria:				
Sofia.....	Nov. 7-13.....	2		
Canada:				
Alberta—				
Calgary.....	Dec. 12-18.....	2		
Do.....	Jan. 2-May 21.....	17	1	
British Columbia—				
Fernie.....	Feb. 6-12.....	2		
Vancouver.....	Dec. 5-11.....	1		
Do.....	Dec. 26-May 7.....	43		
Victoria.....	Jan. 30-Mar. 5.....	5		
Manitoba—				
Winnipeg.....	Jan. 16-Apr. 30.....	30		
New Brunswick.				
Bonaventure and Gaspe Counties.	Feb. 1-May 30.....	18		From lumber camp on Canadian Government R. R., Feb. 5, 1921, 5 cases.
Campbellton.....	Jan. 9-15.....			Present.
Charlotte County.....	Apr. 24-May 7.....	7		
Gloucester County.....	Jan. 23-29.....	1		
Madawaska County.....	Jan. 30-Feb. 19.....	2		
Northumberland County.	Mar. 6-May 21.....	3		
Restigouche County....	Dec. 12-18.....	1		
Do.....	Feb. 6-19.....	2		
St. Stephen.....	Feb. 27-Mar. 5.....	1		
York County.....	.....do.....	6		
Nova Scotia—				
Sydney.....	Feb. 13-May 21.....	9		
Yarmouth.....	Jan. 9-Mar. 26.....	9		
Ontario.....				November-December, 1920: Cases, 992; deaths, 5. Jan. 1-31, 1921: Cases, 902; deaths, 3.
Hamilton.....	Dec. 19-31.....	9		
Do.....	Jan. 2-May 28.....	77		
Kingston.....	Dec. 26-Apr. 23.....	15		
London.....	Jan. 2-May 7.....	38		
Montreal.....	Jan. 2-Apr. 23.....	15		
Niagara Falls.....	Dec. 12-18.....	1		
North Bay.....	Dec. 12-25.....	4		
Do.....	Jan. 2-May 7.....	36		
Ottawa.....	Dec. 12-25.....	75	1	
Do.....	Dec. 26-May 28.....	837	3	
Peterborough.....	Dec. 26-Apr. 30.....	7	1	
Prescott.....	Apr. 3-9.....	1		
Sarnia.....	Feb. 20-May 28.....	3		
Sault Ste. Marie.....	Jan. 9-Feb. 12.....	48		Mar. 27-Apr. 23, 1921 Present.
Toronto.....	Dec. 12-25.....	7		Four reported cases.
Do.....	Dec. 26-May 21.....	78		
Quebec—				
Quebec.....	Jan. 28-Feb. 19.....	2		
Saskatchewan—				
Moose Jaw.....	Dec. 19-25.....	1		
Do.....	Jan. 2-Apr. 30.....	16		
Regina.....	Dec. 12-25.....	11		
Do.....	Jan. 2-May 28.....	87		
Saskatoon.....	Dec. 16-22.....	20		
Do.....	Jan. 9-Mar. 26.....	28		
Ceylon:				
Colombo.....	Nov. 21-Dec. 25.....	18	7	
Do.....	Dec. 26-Apr. 16.....	6	2	
Chile:				
Antofagasta Province—				
Antofagasta.....	Mar. 21-May 15.....	170	48	Present at interior nitrate plants; April and May, 1921.
Calama.....	.....do.....			Present.
Mejillones.....	.....do.....			Do.
Ollague.....	.....do.....			Do.
Tacna.....	Apr. 23.....			Do.
Coquimbo Province—				
Coquimbo.....	Feb. 13-19.....	2		
Tarapaca Province—				
Iquique.....	Mar. 16.....			Epidemic with high mortality.
China:				
Amoy.....	Nov. 7-Dec. 25.....		7	
Do.....	Dec. 26-Apr. 23.....		18	
Antung.....	Dec. 20-26.....	1		
Do.....	Jan. 10-Apr. 24.....	6	3	
Canton.....	Dec. 1-31.....			Present.
Do.....	Jan. 1-Mar. 31.....			Do.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
China—Continued.				
Chungking.....	Nov. 7-Dec. 25.....			Present.
Do.....	Dec. 26-Apr. 16.....			Do.
Foochow.....	Nov. 7-Dec. 25.....			Do.
Do.....	Dec. 26-Apr. 16.....			Do.
Hangkow.....	Jan. 2-22.....	2	1	
Hongkong.....	Jan. 16-Mar. 26.....	43	32	
Manchuria Province—				
Dairen.....	Nov. 16-Dec. 20.....	12	3	
Do.....	Dec. 28-Apr. 24.....	505	63	
Mukden.....	Dec. 12-18.....			Prevalent.
Do.....	Jan. 16-Apr. 30.....			Present.
Nanking.....	Nov. 14-Dec. 13.....			Do.
Do.....	Dec. 26-Apr. 23.....			Do.
Shanghai.....	Feb. 7-Apr. 30.....	4	2	
Tientsin.....	Nov. 14-Dec. 4.....	2		Dec. 12-25, 1920: Cases, 160; in camp for famine refugees.
Do.....	Dec. 26-Apr. 23.....	17	1	In camp for famine refugees, Dec. 26, 1920-Feb. 5, 1921: Cases, 477.
Tsinanfu.....	Oct. 31-Nov. 12.....	20		Statistics of Shantung Christian Hospital.
Tsingtau.....	Jan. 3-Mar. 27.....	6	2	
Chosen (Korea):				
Chemulpo.....	Dec. 1-31.....	1		
Fusan.....	Nov. 1-30.....	1		
Do.....	Jan. 1-Mar. 31.....	7	2	
Gensan.....	Dec. 1-31.....	15	12	
Do.....	Jan. 1-Mar. 31.....	45	24	
Seoul.....	Mar. 1-31.....	1		
Colombia:				
Baranquilla.....	Jan. 16-Mar. 12.....			Present.
Santa Marta.....	Dec. 5-25.....			Do.
Do.....	Dec. 26-May 21.....			Do.
Cuba:				
Antilla.....	Dec. 7-27.....	10		For port of Preston. May 7-14: 1 case from Baracoa.
Do.....	Jan. 2-May 21.....	100		Reported seriously prevalent during January, 1921. Mar. 17, 1921: 386 cases reported.
Camaguey Province.				
Cienfuegos.....	Mar. 13-Apr. 2.....	3		1 from Jatibonico, Cuba; 1 from Jamaica.
Habana.....	Dec. 31-Feb. 16.....	11		Vicinity of Nuevitas. Dec. 6-12, 1920: 1 case. Apr. 25-May 1, 1921: Present.
Lugareno.....	Mar. 7-13.....	2		
Matanzas.....	Jan. 2-29.....	6		
Nuevitas.....	Dec. 6-19.....	2		
Do.....	Jan. 3-May 8.....	82		And vicinity.
Oriente Province.....				Mar. 17, 1921: 394 cases reported.
Santiago.....	Nov. 20-Dec. 10.....	26		
Do.....	Feb. 1-May 20.....	289	1	"Alastrim" reported present. Estimated, Mar. 1-20, 1921: Cases, 1,000.
Czechoslovakia.....				
Danzig.....	Dec. 5-18.....	2		July 11-Aug. 14, 1920: Cases, 141; deaths, 29.
Dominican Republic:				
Santo Domingo.....	Jan. 9-Feb. 19.....	13	1	Nov. 15-Dec. 25, 1920: Cases 9; occurring in 4 localities.
Ecuador:				
Guayaquil.....	Nov. 16-Dec. 31.....	33	2	
Do.....	Jan. 1-Apr. 30.....	88		
Egypt:				
Alexandria.....	Dec. 17-31.....	3	1	
Do.....	Jan. 1-Apr. 8.....	11	2	
Cairo.....	Oct. 1-Dec. 9.....	3		
Do.....	Jan. 8-May 11.....	3	2	
Port Said.....	Nov. 19-Dec. 31.....	1	1	
Do.....	Jan. 8-14.....		1	
France:				
Paris.....	Nov. 1-30.....	2	1	
Do.....	Jan. 1-31.....	7	1	
Rouen.....	Nov. 21-Dec. 31.....	7	2	
Do.....	Feb. 13-Mar. 19.....	4	1	
St. Etienne.....	Dec. 3-15.....	2	1	
Do.....	Jan. 23-Feb. 12.....	3		
Germany.....				
Great Britain:				
Belfast.....	May 8-14.....	1		Aug. 29-Nov. 6, 1920: Cases, 40.
Glasgow.....	Dec. 25.....	11	2	Mar. 13-Apr. 30, 1921: Cases, 142.
Do.....	Jan. 2-Mar. 19.....	23	8	
Liverpool.....	Jan. 30-Feb. 5.....	1		
London.....	Dec. 26-Jan. 1.....	1		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.
Reports Received from Jan. 1 to June 17, 1921—Continued.
SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Greece:				
Patras.....	Apr. 4-10.....		1	
Saloniki.....	Nov. 15-Dec. 26.....	39	14	
Do.....	Dec. 27-May 1.....	59	34	In surrounding country: Cases, 21; deaths, 2. Cases reported Mar. 14-Apr. 3, 1921, were among Russians.
Haiti:				
Cape Haitien.....	Feb. 13-May 7.....	219		
Port au Prince.....	Sept. 22-Dec. 2.....	430	2	In 8 interior towns, 20 cases. In one locality, 18 cases. In country districts, vicinity of Port au Prince, cases numerous. From date of outbreak, Sept. 22, 1920, to Apr. 21, 1921: Cases, 3,163, deaths, 297.
Honduras:				
Ceiba.....	Feb. 13-Mar. 5.....	4		
India:				
Bombay.....	Nov. 7-Dec. 25.....	11	3	
Do.....	Dec. 26-Apr. 15.....	547	223	Sept. 26-Oct. 9, 1920: Deaths, 250. Oct. 31-Dec. 11, 1920: Deaths, 2,902. Dec. 19-23, 1920: Deaths, 353. Dec. 28, 1920-Feb. 19, 1921: Deaths, 4,031.
Calcutta.....	Dec. 6-11.....	2	2	
Do.....	Jan. 2-Apr. 30.....	48	33	
Karachi.....	Jan. 16-Apr. 30.....	57	2	
Madras.....	Nov. 1-Dec. 18.....	7	5	
Do.....	Dec. 26-Apr. 30.....	140	31	
Rangoon.....	Nov. 21-Dec. 25.....	5	1	
Do.....	Jan. 2-Apr. 16.....	56	10	
Indo-China:				
Saiyoon.....	Mar. 13-20.....	1		July 1-21, 1920: Cases, 167; deaths, 24.
Italy:				
Catania.....	Nov. 23-Dec. 5.....	1		
Do.....	Feb. 14-Mar. 12.....	11		In Province, Nov. 29-Dec. 28, 1920: Cases, 43. Jan. 3-10, 1921: Cases, 32. Jan. 17-May 8, 1921: Cases, 119.
Genoa.....	Feb. 7-13.....	3		
Messina (city and Province)	Jan. 3-Apr. 27.....	67	14	
Palermo.....	Oct. 30-Dec. 27.....	410	121	Dec. 5, 1920-Jan. 2, 1921: Cases, 287.
Do.....	Jan. 28-May 3.....	287	39	15.
Trieste.....	May 8-14.....	1		In emigrant.
Japan:				
Kobe.....	Mar. 16-May 9.....	11	1	
Nagasaki.....	Mar. 27-May 1.....	42	5	Apr. 28: Epidemic.
Java:				
West Java:				
Bandoeng.....	Nov. 10-25.....	1	1	
Do.....	Feb. 3-Apr. 14.....	3	1	Nov. 12-Dec. 20, 1920: Cases, 72; deaths, 6. Jan. 6-Mar. 30, 1921: 82 cases, 40 deaths.
Batavia.....	Nov. 12-Dec. 25.....	14	5	
Do.....	Jan. 27-Apr. 6.....	16	5	
Buitenzorg.....	Feb. 10-23.....	12	2	
Garoet.....	Jan. 27-Apr. 14.....	3		
Indramayo.....	Nov. 12-Dec. 29.....	1		
Krawang.....	do.....	1		
Do.....	Jan. 13-Apr. 14.....	74	9	
Lebak.....	Jan. 13-Apr. 14.....	46	14	
Pandeglang.....	Jan. 27-Apr. 14.....	27	8	
Jugoslavia.....	July 25-Aug. 28.....	123	42	Feb. 7-13, 1920: Cases, 122; deaths, 27. Oct. 7, 1920-Jan. 1, 1921: Cases, 422. Jan. 2-30, 1921: Cases, 455.
Belgrade.....	Feb. 27-Mar. 5.....	1		
Zagreb.....	Jan. 9-Apr. 30.....	9	1	
Luxemburg.....	Dec. 15-Jan. 1.....	1		
Madagascar:				
Tananarivo.....	Jan. 17-23.....		2	
Madeira:				
Funchal.....	Dec. 5-18.....		2	
Do.....	Dec. 26-Mar. 19.....		9	
Malta.....	Apr. 16-30.....	1		
Mesopotamia:				
Bagdad.....	Nov. 1-Dec. 31.....	2		
Do.....	Jan. 1-Mar. 31.....	2	2	
Mexico:				
Chihuahua.....	Dec. 6-25.....	11	3	
Do.....	Dec. 27-May 15.....		17	
Ciudad Juarez.....	Mar. 21-27.....		1	
Guadalajara.....	Dec. 1-31.....	1		
Do.....	Jan. 1-Apr. 30.....		4	
Mexico City.....	Nov. 14-Dec. 25.....	17		
Do.....	Jan. 2-May 7.....	384		Including municipalities in the Federal district.

**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW
FEVER—Continued.**

Reports Received from Jan. 1 to June 17, 1921—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Mexico—Continued.				
Monterey.....	Mar. 29-Apr. 4.....		4	
Salina Cruz.....	Jan. 1-Apr. 30.....	5	3	
Saltillo.....	Apr. 17-23.....		7	
San Luis Potosi.....	Feb. 6-Apr. 30.....		2	
Tecate.....	Jan. 17.....	3		
Torreón.....	Jan. 1-Feb. 28.....	6	3	
Newfoundland:				
Bonne Bay.....	Mar. 20-Apr. 1.....	1		
Grand Falls.....	Mar. 12-18.....	1		
Lewisport.....	Apr. 2-8.....			Present.
St. Johns.....	Jan. 22-May 13.....	5		
Norway:				
Stavanger.....	Jan. 23-29.....	3		
Panama:				
Colon.....	Jan. 5-May 10.....	125		
Peru:				
Callao.....	Mar. 1-31.....	1		
Poland.....				
Warsaw.....	Sept. 1-30.....	3		Sept.-Oct., 1920: Cases, 175; deaths, 37.
Portugal:				
Lisbon.....	Nov. 28-Dec. 18.....		5	
Do.....	Dec. 26-May 7.....		27	
Oporto.....	May 3-16.....	4		
Portuguese East Africa:				
Chai-Chai.....	Jan. 9-Feb. 12.....			Present. One death reported.
Chinde.....	Jan. 2-8.....			Present.
Gaza district.....	Dec. 18-23.....			Do.
Inhambane district.....	Dec. 26-Mar. 26.....			Do.
Lourenco Marques.....	Oct. 24-Dec. 11.....	10		Reported present in interior of Chai-Chai district.
Do.....	Mar. 20-Apr. 9.....	3	1	
Quelimane.....	Oct. 24-Dec. 11.....	3		
Rumania:				
Bessarabia Province.....	Jan. 1-27.....	202		
Bucharest.....	Nov. 1-30.....	1		
Cernowitz.....	Jan. 1-31.....	5	1	
Galata.....	Dec. 1-31.....	1		
Jassy.....	Nov. 1-Dec. 31.....	7	1	
Kiseneff.....	Jan. 1-Mar. 18.....	18		District.
Russia:				
Esthonia Province.....	Oct. 1-Nov. 30.....	28		Dec. 1-31, 1920: Cases, 17. Jan. 1-Feb. 28, 1921: Cases, 50, not including cases in military hospitals.
Reval.....	Nov. 1-Dec. 31.....	17		
Latvia—	Feb. 1-28.....	21		
Riga.....	Oct. 1-Dec. 31.....	3	1	
Siberia—	Feb. 1-28.....	1		
Vladivostok.....				
Do.....				
Senegal:				
Dakar.....	Mar. 1-Apr. 30.....			Present.
Siam:				
Bangkok.....	Feb. 13-Apr. 2.....	2		
Sierra Leone:				
Freetown.....	May 2.....			Do.
Spain:				
Barcelona.....	Nov. 18-Dec. 29.....		13	
Do.....	Jan. 13-Apr. 6.....		32	
Corunna.....	Dec. 12-18.....	1	1	
Madrid.....	Nov. 1-30.....	1	1	Year ended Dec. 31, 1920: Deaths, 9.
Do.....	Feb. 6-13.....	1	1	
Malaga.....	Oct. 1-Dec. 31.....		77	
Do.....	Jan. 1-Apr. 30.....		69	
Tarragona.....	Jan. 30-Feb. 19.....		2	
Valencia.....	Dec. 5-25.....	3		
Do.....	Dec. 26-May 1.....	28	4	
Switzerland:				
Basel.....	Mar. 30-Apr. 2.....	5		
Zurich.....	May 1-7.....	1		
Syria:				
Aleppo.....	Nov. 14-Dec. 4.....			Dec. 12-25, 1920: Present.
Do.....	Jan. 18-Feb. 5.....			Present.
Beirut.....	Apr. 20-30.....	1		
Tunis:				
Tunis.....	Nov. 30-Dec. 28.....	10	18	
Do.....	Jan. 8-May 6.....	64	49	
Turkey:				
Constantinople.....	Nov. 21-Dec. 11.....	4		
Do.....	Jan. 2-Apr. 23.....	33	2	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

SMALLPOX—Continued.

Placc.	Date.	Cases.	Deaths.	Remarks.
Union of South Africa.....	Feb. 27-Apr. 12.....			Outbreaks, Cape Province, Natal, Orange Free State, and Transvaal.
Cape Province.....	Jan. 23-Apr. 9.....			Outbreaks.
Natal.....				Feb. 13-19, 1921: Present in rural areas.
Durban district.....	Jan. 23-Feb. 5.....			Outbreak.
Orange Free State.....	Jan. 23-Apr. 9.....			Outbreaks. Feb. 13-19, 1921: Present in rural areas.
Transvaal.....				Jan. 23-Apr. 9, 1921: Outbreaks.
Johannesburg.....	Oct. 1-3.....	1		
Do.....	Jan. 23-Apr. 9.....	2		From Portuguese East Africa.
Uruguay:				
Montevideo.....	Dec. 1-31.....	6	2	
Do.....	Jan. 1-Feb. 23.....	7	1	
Venezuela:				
Puerto Catello.....	Apr. 3-9.....		1	
Cn vessels:				
S. S. Alfonso XIII.....	Dec. 27.....	1		At Habana, Cuba, from ports in northern Spain.
S. S. Cadiz.....	Jan. 5.....	1		At Habana, Cuba, from Mediterranean ports.
U. S. S. Mississippi.....	Feb. 18-20.....	22		In Canal Zone.
S. S. Ohioan.....	Jan. 4.....	1		At San Pedro, Calif., from New York, via Baboia, Canal Zone.
S. S. Ventura.....	Jan. 18.....	1		At Sydney, Australia, from San Francisco, Calif., via Honolulu and Pago Pago, Samoa.
S. S. _____.....	Mar. 27-Apr. 2.....	2	1	At quarantine, St. John, New Brunswick. From Europe.

TYPHUS FEVER.

Algeria:				
Algiers.....	Jan. 1-Apr. 30.....	49	10	
Oran.....	Mar. 11-Apr. 30.....	172	42	
Eclivia:				
La Paz.....	Dec. 1-31.....	13	9	
Do.....	Jan. 1-Mar. 31.....	214	206	
Brazil:				
Bahia.....	Mar. 27-Apr. 9.....	4	4	
Ceara.....	Oct. 17-Dec. 26.....		3	
Do.....	Jan. 2-Apr. 2.....		8	
Bulgaria:				
Sofia.....	Jan. 2-Apr. 16.....	13	1	
Chile:				
Arica.....	Feb. 16-Mar. 25.....	12	1	Among laborers arriving from the arid region by way of Iquique, Chile, Feb. 16, 1921.
Concepcion.....	Nov. 1-Dec. 27.....		23	
Do.....	Dec. 28-Mar. 28.....		16	Present in vicinity, Year 1920, in public hospital, 89 cases, 13 deaths.
Coquimbo.....	Dec. 1-7.....		1	
Valparaiso.....	Oct. 25-Nov. 27.....		13	
Do.....	Jan. 30-Mar. 19.....		14	
China:				
Manchuria Province—				
Harbin.....	Ncv. 22-28.....	1		On Chinese Eastern Railway.
Do.....	Jan. 3-9.....	1		
Manchuria Station.....	Nov. 22-28.....	2		Do.
Do.....	Jan. 10-16.....	1		
Chosen (Korea):				
Chemulpo.....	Feb. 1-28.....	1	1	
Seoul.....	Dec. 1-31.....	1		
Do.....	Jan. 1-Mar. 31.....	2		
Colombia:				
Barranquilla.....	Mar. 13-19.....		1	
Czechoslovakia:				
Prague.....	Feb. 1-21.....	2		July 11-Aug. 28, 1920: Cases, 138; deaths, 18. Reported present, Feb. 19, 1921.
Danzig.....	Dec. 20.....	1		In emigrant from Brest-Litovsk, with 2 weeks' stay at Warsaw.
Do.....	Jan. 16-Feb. 5.....	3	1	
Egypt:				
Alexandria.....	Nov. 19-Dec. 31.....	13	6	
Do.....	Jan. 1-Apr. 15.....	32	15	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Egypt—Continued.				
Cairo.....	Oct. 1-Dec. 28.....	44	32	
Do.....	Jan. 1-May 18.....	45	27	
Port Said.....	Feb. 19-25.....	1		
Germany.....				Sept. 12-Dec. 25, 1920: Cases, 259; including 11 in a camp. Dec. 26, 1920-Jan. 8, 1921: Cases, 7.
Great Britain:				
Belfast.....	Dec. 5-25.....	13		
Do.....	Jan. 9-Mar. 19.....	8	1	
Dublin.....	Nov. 28-Dec. 13.....	4	3	
Do.....	Jan. 9-Apr. 9.....	13	2	
Greece:				
Drama.....	Nov. 22-28.....	1		
Do.....	Feb. 28-Mar. 6.....	1		
Kavalla.....	do.....	2		
Patras.....	Nov. 29-Dec. 5.....		1	
Saloniki.....	Oct. 25-Dec. 26.....	34	9	
Do.....	Jan. 10-Apr. 24.....	1,232	90	In civil population, Jan. 31-Apr. 17, 1921: Cases, 24; deaths, 22. Remainder among refugees from the Caucasus and Russia. At other localities in the district, Feb. 28-Mar. 13, 1921: Cases, 27; deaths, 2.
Serres.....	Nov. 8-14.....	1		
Guatemala				
Guatemala City.....	Mar. 1-31.....		1	Feb. 1-Mar. 12, 1921: Present in highland departments. In vicinity of Guatemala City, Mar. 1-31, 1921: Several cases. Aug. 3-Dec. 5, 1920: Cases, 38.
Hungary				
Budapest.....	Nov. 8-Dec. 5.....	2		
Indo-China:				
Saigon.....	Mar. 27-Apr. 8.....	1	1	
Italy:				
Naples.....	Feb. 23.....	2		
Trieste.....	Feb. 14.....	30		Among emigrants intending to come to United States.
Japan:				
Nagasaki.....	Nov. 15-Dec. 26.....	10	1	
Do.....	Dec. 27-May 1.....	36	8	
Jugoslavia:				
Belgrade.....	July 25-Aug. 28.....	27	5	Feb. 7-13, 1920: Cases, 84; deaths, 2. Oct. 7, 1920-Jan. 1, 1921: Cases, 395. Jan. 2-29, 1921: Cases, 197.
Modjurnurju Province.....	Jan. 2-8.....	73		114 remaining cases.
Do.....	Feb. 13-19.....	42		51 remaining cases.
Zagreb.....	Dec. 12-25.....	27		
Do.....	Dec. 26-Feb. 21.....	41	6	City and county.
Malta.....	Dec. 1-31.....	1		
Mesopotamia:				
Bagdad.....	Nov. 1-30.....	1	1	
Do.....	Feb. 1-28.....	1	1	
Mexico:				
Guadalajara.....	Dec. 1-31.....	11		
Do.....	Jan. 1-Mar. 31.....	11	5	
Mexico City.....	Nov. 14-Dec. 25.....	67		Including municipalities in the Federal district.
Do.....	Dec. 26-May 7.....	278		Do.
San Luis Potosi.....	Dec. 5-31.....			Present.
Do.....	Jan. 16-May 14.....			Present. Five deaths reported.
Morocco:				
Casa Blanca.....	June 10.....	59	3	
Netherlands:				
Rotterdam.....	Jan. 23-29.....	1		
Poland:				
District—				
Galicja.....	Nov. 1-30.....	1,192	286	Sept.-Oct., 1920: Cases, 3,848; deaths, 371. Nov. 1-30, 1920: Cases, 3,059; deaths, 350. Dec. 1-31, 1920: Cases, 4,644; deaths, 550. Jan. 1-31, 1921: Cases, 5,308; deaths, 597. Year 1920: Cases, 161,846.
Kielce.....	do.....	279	15	
Lodz.....	do.....	83	6	
Lublin.....	do.....	403	20	
Posen.....	do.....	17		
Silesia.....	do.....	6		
Warsaw.....	do.....	191	15	
Warsaw city.....	Nov. 1-Dec. 16.....	96	8	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Jan. 1 to June 17, 1921—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Poland—Continued.				
District—				
Bialystok.....	Jan. 1-31.....	321	33	
Galicia.....	do.....	3,427	457	
Kielce.....	do.....	426	42	
Lodz.....	do.....	200	14	
Lublin.....	do.....	383	18	
Posen.....	do.....	13		
Silesia.....	do.....	1		
Warsaw.....	do.....	340	16	
Warsaw city.....	do.....	197	17	
Portugal:				
Oporto.....	Nov. 23-Dec. 4.....	1		
Do.....	Dec. 26-Apr. 18.....	6	3	
Rumania:				
Cities and districts—				
Bucharest.....	Nov. 1-Dec. 31.....	9	1	
Do.....	Jan. 1-31.....	7		
Cahul district.....	Feb. 1-28.....	13		
Constanza.....	Dec. 1-31.....	9		
Kissened district.....	Mar. 1-31.....	78		
Provinces—				
Bessarabia.....				Nov. 30, 1920: Cases, 101.
Do.....	Jan. 1-Feb. 27.....	426		
Bukowina.....				Jan. 29, 1921: Cases, 103.
Transylvania.....	Dec. 1-31.....	81		Including Banat.
Do.....	Jan. 1-Feb. 14.....	41		In the old Kingdom of Rumania on Dec. 31, 1920, 119 cases reported present.
Russia:				
Province—				
Esthonia.....				Sept. 1-Dec. 31, 1920: Cases, 455;
Latvia.....				Jan. 1-Mar. 31, 1921: Cases, 389.
Riga.....	Nov. 1-Dec. 31.....	185		
Do.....	Jan. 1-Mar. 31.....	779		
Lithuania.....				Feb. 19, 1921: Cases, 175; mortality, 5 to 6 per cent.
Ruthenia.....				Feb. 19, 1921: Occurrence of about 5 fatal cases daily. Mar. 5, 1921, 200 fatal cases previously unreported.
Siberia—				
Vladivostok.....	Jan. 1-Feb. 28.....		9	Dec. 1-31, 1920: Cases, 11; deaths, 6.
Ukraine.....				Feb. 19, 1921: Occurrence of about 5 fatal cases daily..
Syria:				
Beirut.....	Apr. 10-20.....	2		
Tunis:				
Tunis.....	Apr. 17-May 13.....	3	2	
Turkey:				
Constantinople.....	Nov. 21-Dec. 25.....	25	1	
Do.....	Jan. 2-May 7.....	61	3	
Union of South Africa.				
Do.....	Feb. 27-Mar. 12.....			September - November, 1920: Cases, 5,144; deaths, 915. Of these, 30 cases, 3 deaths were among whites; remainder among natives and colored.
Cape Province.....				
Cape Town.....	Dec. 20-26.....	16	5	Outbreaks reported in Cape Province and Transvaal.
East London.....	Jan. 29-Apr. 23.....	7	3	Feb. 13-19, 1921: Outbreaks reported. Mar. 12-Apr. 9: Outbreaks.
Port Elizabeth.....	Jan. 20-Feb. 5.....	1		
Natal.....	Feb. 13-19.....			Outbreak.
Orange Free State.....	Jan. 23-Feb. 5.....			Outbreaks.
Transvaal.....				Mar. 27-Apr. 9, 1921: Outbreaks.
Johannesburg.....	Jan. 23-Feb. 5.....	1		District.
On vessels:				
S. S. Presidente Wilson.....	Feb. 1-6.....	15		At New York. From Trieste, Itzly, Jan. 15; Naples, Jan. 18; and Algiers, Jan. 22, 1921.
S. S. San Giusto.....	Feb. 10-Mar. 3.....	22		At New York. From Trieste, Jan. 23, and Naples, Jan. 26, 1921.

**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW
FEVER—Continued.**

Reports Received from Jan. 1 to June 17, 1921—Continued.

YELLOW FEVER.

Place.	Date.	Cases.	Deaths.	Remarks.
Brazil:				
Bahia.....	Apr. 10-16.....	1	1	
Pernambuco.....	Nov. 14-21.....	1	1	
Mexico:				
Orizaba.....	Dec. 5-18.....	2	1	
Papantla.....	.....do.....	8	2	
Do.....	Jan. 9-15.....	1	1	
Tampico.....	Dec. 12-18.....	1	1	
Tuxpam.....	Dec. 5-18.....	9	4	
Do.....	Dec. 25-Jan. 1.....	5	1	
Vera Cruz.....	Dec. 5-26.....	8	3	May 18, 1921: One case, stated to have come from point 40 miles distant.
Do.....	Dec. 26-Mar. 20.....	6	1	
Zamora.....	Dec. 12-18.....	1	1	Also called Gutierrez, State o Vera Cruz.
Peru:				
Department—				
Lambayeque.....	.....	.....	.....	Outbreak reported Jan. 22, 1921.
Chiclayo.....	Feb. 1-28.....	18	6	
Eten.....	.....do.....	7	2	
Ferrenafe.....	Jan. 1-31.....	18	17	
Do.....	Feb. 1-28.....	44	19	
Lambayeque.....	Jan. 1-30.....	2	1	
Do.....	Feb. 1-28.....	4	.....
Monsefu.....	Feb. 16-28.....	2	.....
Libertad—				
Trujillo.....	Apr. 28.....	.....	.....	Present.
Piura.....	.....	.....	.....	June-December, 1919: Cases, 173; deaths, 41. January-August, 1920: Cases, 455; deaths, 111. First period, occurrence in 6 localities; second period, in 12 localities.
On vessel:				
S. S. Savoia.....	Jan. 11-15.....	4	.....	At Habana, Cuba, from Vera Cruz, Mexico. Vessel arrived Habana, Jan. 10, 1921, with three cases sickness on board. Two cases confirmed. Two cases developed later on board; confirmed Jan. 15. Savoia left Vera Cruz Jan. 6, 1921.